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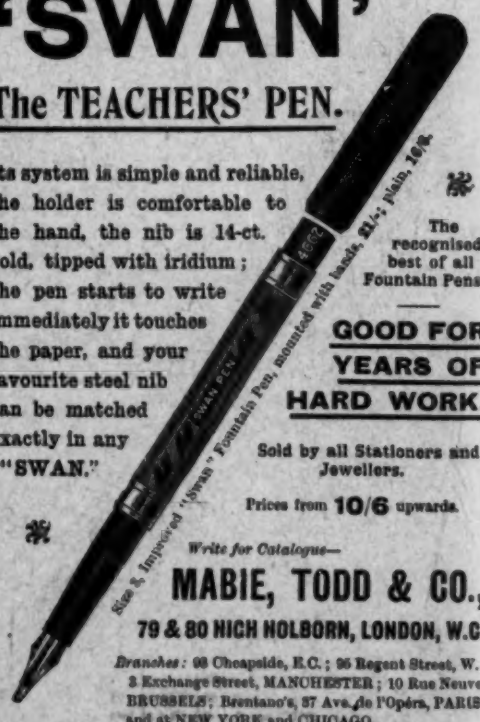

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Educational Opinion.

A Well-Deserved Monument.

JULES VERNE has come into his own. A monument to his memory has been erected in Amiens, and unveiled by M. Jules Claretie. There is a certain appropriateness in the article which the *Revue Pédagogique* consecrates to the event, for every boy of reading age has, at one time or another, professed the cult of the great romancer. What thrills coursed through us as we gloated over the pages of the *Voyage to the Moon*, or *Five Weeks in a Balloon*, or *Twenty Thousand Leagues under the Sea!* And there was nothing morbid in the shivers and throbs. The books fed the wild adventurous longings which every healthy boy suffers at a certain age, and generation after generation has gone to Jules Verne, just as Defoe, Fenimore Cooper, Captain Marryat, and Mayne Reid have been laid under contribution. Simple, good, loyal, witty, yet timid are the epithets applied by M. Claretie to the story-writer, who seems to have earned golden opinions not only in his native town of Nantes, but in his adopted home of Amiens. The quality of his work earned for him, at any rate, a vast influence, to which his eulogist attributes the late-developed adventurous spirit of the French in Asia and Africa. One curious thing occurs in the commemorative speech—that it was George Sand, the painter of country scenes, who gave Verne the idea of his submarine story.

* * *

Through American Spectacles.

TO the expressions of opinion made by our American visitors yet another, and by no means the least striking, is to be added. The critic is Mrs. Houghan of Denver, who has delivered herself of a series of lengthy articles in the *Journal of Education*. In one way the length of the opinion is a good sign. English schools could not be dismissed in a few words; the visit evidently provoked much thought and mental questioning There is much kindly appreciation, amounting to genuine admiration at times, though it could hardly be expected that an acute critic from the outside world would find everything perfect in our ways and doings. We are thankful for the praise, and must lay to heart the criticisms. At the same time, apart from an occasional *naïveté*, it is difficult to see where some of the information has been procured. Such as, "The period of recitation—that is, lesson—is longer than in America, often exceeding forty minutes, *even in the infants' classes.*" Rather an unwarrantable assertion; as also, that evening classes often reach an attendance of *five thousand!* Would that they did! There would then be less necessity for the compulsion which we all see must be sooner or later applied respecting continuation courses. It is some little gratification to know that "the habit of *gum-chewing* and eating candy is almost unknown among these children." And so far as the first habit is concerned, we profoundly hope it will remain unknown.

* * *

A Balance Sheet

AT the conclusion of her long series of impressions, Mrs. Houghan draws up a sort of balance sheet of her residual gain and loss, the points in which America would gain by following England, and those in which England might imitate our cousins. It is a generous confession, a grand attempt to be strictly impartial, so that we should be ungrateful were we to quarrel with any of her conclusions. We merely note a few for the benefit of Britishers. "England is hampered financially by prejudice, and by long-established customs and traditions." "She is doing a grand work, though in some respects America is doing a better." "England can point to better attendance and truancy laws, better provision for subnormal children; a more wholesome respect for authority, a greater inculcation of thrift, and a better training for girls in domestic science." That is not a bad asset at all. But Mrs. Houghan is thankful "that there is no class distinction in our country; that we have keen, wide-awake, progressive superintendents; *that we have no inspectors to make our blood boil over their inefficiency!*"—which is a trumpet-blast by way of conclusion. She pays unstinted praise to the kindness and courtesy she encountered while here, which made her visit an enduring memory.

* * *

Ancient and Modern Books.

UNDER the title of *From Absurd to Beautiful Books*, Dr. Winship, editor of the *Journal of Education*, has been drawing comparisons between American school books of to-day and those of seventy or eighty years ago. He has gathered some of the most weirdly and gruesomely interesting examples we remember ever to have seen. According to him, ancient arithmetics ran to ghastly horrors in their choice of examples, killings and drownings, mutilations—for example, the cutting off of thumbs and toes by Adoni-bezek—forming stock subjects on which to base calculations! He gives numerous examples, ludicrous and sanguinary. Our early arithmetical examples dealt much with problematic feats of labour by very imaginary British workmen, but we do not remember that they revelled in gore as Dr. Winship's arithmetics do. The geographies, illustrated with woodcuts, vied with the arithmetics. From his library, Dr. Winship has produced some master examples of what a schoolbook should not contain—earthquakes, preparation of human sacrifices, the suttee, and ghastly incidents in the animal and reptile world. Truly the young Yankee of a hundred years ago was brought up on strong food, and we join with Dr. Winship in gratitude that such books have passed away, never to be recalled, and that the schoolbook of the present day is a thing of taste and good sense.

* * *

The Euthanasia of the Half-Timer.

THE report of the Inter-Departmental Committee on Half-timers is good reading, for it points to the speedy extinction of what has for long been a blot on our school system. That school teachers should be practically unanimous in desiring the cessation of the half-timer plan, as the report states, was but to be expected. They, and they alone, are best qualified to be the ultimate judges of the effect of the system—a system that has been kept in being by the greed of employers and parents at the

BRITISH MUSEUM

expense of the child-workers. It is strange that any one could be found to say a good word for it, as was done at a recent Trades Union Congress; and more recently still by a northerner, who declared it improved the physique of the children! We should be inclined to urge that if physique were maintained or improved, it was in spite of the labour and not because of it, for any other statement is in direct opposition to the known physiological laws of growth. Anyway, the half-timer is doomed, and we opine that very few will be found honestly to mourn his demise.

THE gazette published by the Department of Education at the Cape gives interesting particulars of the state of education throughout the colony. It appears that almost half of the entire staff in the primary schools are without professional qualification, though the proportion tends to decrease. And at the Cape teachers are becoming scarce! English students will cast envious eyes beyond the Equator as to a teacher's El Dorado. The average age at which students—that is, European students—pass out of college into the teaching world is given as 18¾, which indicates a low standard of qualification. This latter, we are given to understand, is on the upward grade: Of native teachers the average age at commencement is nearly two years higher than in the case of Europeans, which again offers an interesting standard of the rate of acquirement as between European and native. From a brief running criticism of schoolbooks we gather that most of the books in use at home find their way south, for many of the great publishing houses for schoolbooks are well represented in the list. And a noticeable thing is the list of additions to the library of the Department of Education, a library open to all the teachers. It is up-to-date and very comprehensive.

Beneath the Southern Cross.

AT times we have a thrill of real envy. It comes oftenest when we read of the immense benefactions made to educational institutions and for educational purposes by wealthy Americans. Such a thrill is started by Mrs. Russell Sage's foundation. A sum of ten million dollars was given two years ago by this lady for an object that may well provoke admiration. Imagine a body of experts with such a fund at their disposal, devoted to the investigation of all the conditions of child life, of school work, able to devote limitless time and money to the problems which beset teachers, education authorities, and governments all the civilized world over. The thought is overpowering. But in one sense it is an endowment for the world. American Government departments and intelligence bureaux are generous to a fault in sharing their results with all who wish to participate; so that we may safely conclude that whatever of good may come from the labours of the body of experts working under the Russell Sage foundation will be at the disposal of education authorities and teachers throughout the world.

A Gorgeous Research Endowment.

ANOTHER grand step in the right direction is indicated in the report of the Consultative Committee on Continuation Schools. If the recommendations of the report are carried out, there is hope that the dreadful leak between the ages of fourteen and seventeen will be stopped at last. During those years the direst waste has been going on for a long time, and it has been depressing to read the jeremiads poured forth on the condition of the growing youth of the country, when all the time teachers were well aware that what was wanted was the compulsory carrying on of school work under practical conditions that should lead to real efficiency in some definite trade or profession, at the age of eighteen or thereabouts. To ensure that efficiency, and stop the waste of national usefulness, nothing short of regular class work for skilled employment, compulsory attendance on definite and prolonged courses of instruction, responsibility laid on the education authorities to provide them, and last, but by no means least, statutory obligation of employers to co-operate with the education authorities—nothing short of these things would meet the case. And it is just these things that the report of the Committee recommends as the strict minimum. We begin to have hopes for the future. Both the half-timer and the hooligan, the shiftless, unskilled, helpless hooligan, are doomed.

To abolish the Hooligan.

THE American *Physical Education Review* contains a full report of the meeting of the Playground Association at Pittsburg. This association is carrying on a propaganda for ample grounds, well equipped, and directed by trained teachers of physical exercises, at a rate and with a success that stir admiration. A sectional committee, composed of well-known teachers, professors, and doctors, presented a report on folk dances as a means of exercise in schools. The report literally leaves nothing more to be said. If any of our readers require information on folk dances, their music, classification, and where to procure them, to say nothing of carefully prepared schemes of dances, we recommend the report to their notice. The *Review* is published in Springfield, Massachusetts, and costs fifty cents—that is, about two shillings.

A Useful Report.

SPECIAL NOTICE.

WITH the October number of the *Practical Teacher* will be presented a

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These questions have been arranged by C. Hamilton, and will prove invaluable for Evening-School Work in the coming Session.

The Proprietors propose to print a number of these Supplements, which will be sold to Teachers in Evening-School Centres for Students' use at a price to be announced in the next issue.

"The Helmet of Navarre."

IT is an easy matter to sneer at the modern historical drama, and to laugh at the dramatist's cheerful distortion of historical fact and probability to suit the sentimentalism of an ordinary British audience. The correct historian, however, in spite of his long innings, has never really interested us in the history of France during the Renaissance. On the other hand, Macaulay's *Ivry* has stirred the blood of nearly every schoolboy,—

"Now glory to the Lord of Hosts, from whom all glories are!
And glory to our sovereign liege, King Henry of Navarre.
* * * * * *
Press where ye see my white plume shine, amidst the ranks of war,
And be your oriflamme to-day the helmet of Navarre!"

Millais' "Massacre of St. Bartholomew" has roused the curiosity and prompted the speculations of many visitors to the Tate Gallery; and such a production as Mr. William Devereux's "Henry of Navarre," which has been delighting London audiences for a long period, has fixed in the mind of thousands of people a few of the chief facts and some conception of the leading personages concerned in that same fatal and foolish crime.

A SCENE FROM "HENRY OF NAVARRE."
(Photo by Ellis and Walery.)

That this is all pure gain everyone must acknowledge. We must give our dramatist as much liberty as was taken by Shakespeare and by Scott. Our only regret is that he is forced, or thinks he is forced, by public opinion to make an occasional joke about Catherine de' Medici as a mother-in-law, or to raise the loud laugh that "bespeaks the vacant mind" by other devices dear to the heart of a typical audience.

Having demonstrated our intellectual superiority by the above reservations, we can proceed to an appreciation of a performance which ought to be witnessed by all our readers who have the opportunity when the play is taken on tour.

In the first place, the setting is magnificent, and in spite of the severe historian, this is not merely a matter of the lust of the eye. It is the result of the most careful study of all available sources of information, and of constructive ability of a very high order on the part of the stage manager and his helpers. And the effect of the whole presentation on the mind of the careful student is beneficial to the highest degree. For matters of costume and household appointments *are* really important, to use an epithet which is much overworked. Thackeray searching patiently in the British Museum to find out with regard to George Washington not his ideals of government, but the kind of clothes he wore, is significant enough for the smaller fry of writers of all grades.

We rejoiced, then, to see Catherine de' Medici wearing her crown on very ordinary occasions. We like to think that she did. She was on the whole the kind of woman who would do so. Childish and mediæval in her passion for power, she would naturally glory in its outward symbol. We who are so ready to cry "Melodrama!" forget the "unplumbed childishness of man's imagination," and the love of prinking which lies dormant in us all.

Mr. Fred Terry plays Henry of Navarre with a gusto which is delightful. He is to the life the man whose jolly ideal was that every peasant should have a fowl to his pot. His laugh is infectious, and provokes responsive mirth of a kind of which no one need fee

ashamed. And behind all his gaiety the actor shows the monarch's consistent purpose—to bring peace to France, even at the cost of his own honour. Theological differences are nothing to him. A Huguenot by training, he becomes a Catholic for state reasons, asserting in a seemingly careless way that "Paris is worth a Mass," but really determined to accomplish his aim in spite of the theologians. "What are you quarrelling about?" he says in effect. Then he knocks together the solemn heads of the conflicting parties, and bids them set to work to heal the wounds of his distracted country. This is the true Henry IV. of history, and by a piece of conscientious work the actor reveals him to the careful observer in a manner which cannot fail to be helpful in any attempt to realise the circumstances of the period.

It is in dealing with the king's relations with Marguerite de Valois that the dramatist is least convincing, and somewhat weakly yields to the demand for a conventional love story, and for that billing and cooing without which, possibly, no play can be a financial success. But surely he misses a historic scene which is full of dramatic possibilities. What about that enforced marriage within the shadow of Notre Dame between the Catholic princess and the Protestant prince; the obstinate refusal of the bride to take the hand of the bridegroom, or even to bow in assent to the most momentous of all questions; the action of the king, her brother, who took her by the head and by sheer physical force compelled her to give the affirmative reply for which the archbishop was waiting? Possibly, however, the scene would have made a wrong appeal, and the dramatist resisted the temptation. After all, a wedding is too solemn a matter for the ribald laughter in which, strangely enough, the great British public is always ready to indulge at the sound of wedding bells.

Miss Julia Neilson, who plays Marguerite, would have made a great success of such a scene as we have ventured to outline above, for she assumes the obstinate to perfection, and we like her tragic moods better than her comedy. She rises well to the occasion in the scene of the massacre, which is on the whole skilfully suggested by the dramatist, and need not deter the most sensitive play-goer who has an opportunity of witnessing the drama. There is perhaps too much restraint in this portion of the play. We imagine that stern business would have been transacted had Henry of Navarre been tracked to his wife's chamber by the numbers here arrayed against him. The device by which the princess hopes to avert death from her husband is somewhat feeble. Millais has made it familiar to all of us in his "Huguenot Lovers," but it might with advantage have been omitted.

The Charles IX. of Mr. Malcolm Cherry is a piece of good work. The weakness of the monarch is well assumed and sustained, and it is a harder thing to simulate imbecility than heroism, which, of course, comes natural to us all. He has a difficult task in the scene where the Queen Mother persuades him to consent to the massacre of the Protestants, and comes well through the ordeal, which ends with his acquiescence on the grim condition that not a Huguenot is left alive in France to reproach him.

Coligny does not appear. Possibly the dramatist designs to make him the centre of another historical play, or remembered that the public would have none of him without a love interest to which history gives us no clue, for the admiral who anticipated the Pilgrim Fathers had other though possibly less interesting objects in life.

OUR ESSAY COMPETITION.

MARY WINSOR,
Girls' Council School, Curledge Street, Paignton, Devon,
Winner of the Prize offered for competition in our June issue.
(Photo by J. H. German.)

THE CHILDREN'S KNIGHT.

[One of our contributors "drops into poetry," moved by an event which has stirred us all—namely, the conferment of the honour of knighthood upon the General Secretary of the N.U.T.]

He glory won on a field of blood,
Sir Knight in the days of old.
The grip of fight in a deadly feud,
A dripping blade, or a foe withstood,
And a lonely watch at a holy rood—
The theme of the tale oft told.

His honour is won in a nobler fight,
Our own Sir Knight's to-day.
His sword the pen, he has championed right,
And, golden tongued, with wisdom dight,
Under the banner of Culture and Light,
Borne the brunt of the fray.

And for the Child he bare his brand,
He warred for the Children's weal;
For the cause of the Schools of his native land,
For a Nation's cause he made his stand,
With a sturdy, stalwart, tireless band,
Watchful and brave and leal

And brightly blazoned upon his shield
This simple legend shall be,
How this true knight, in hall or afield,
The soul of Chivalry revealed—
To foeman and friend alike did yield
An old-time Courtesy.

We honour the King for an honour done,
Where honour has fallen aright;
We praise the King for honouring one
Whom we of the schools proclaim our own,
Who by his love our love has won—
This faithful Children's Knight.

R. R. C. GREGORY.

ELTHAM, 28th *June* 1909.

The New Constructive Movement.

WHAT IS BEING DONE IN THE MOST PROGRESSIVE SCHOOLS TO MAKE THE PRIMARY TEACHING TOUCH EVERYDAY LIFE AT ALL POINTS.

SUGGESTIONS FROM AMERICAN SCHOOLS.

BY W. H. WINCH, M.A.

TWO months ago I endeavoured to give an account of the work of American kindergartens in so far as it seemed to bear on the constructive work of children in senior schools. To-day, I propose to add a little to the foregoing account. In a previous issue I asserted that it was more in accord with psychological teaching to begin constructive drawing earlier, and object drawing (by which I mean the drawing of the actual appearances of objects) later, than is usually done in this country. I was not always understood. Some London teachers asked me if I wished to see the time allotted to drawing reduced in elementary schools.

I am bound to say that there are still kinds of drawing now practised here and there whose value seems to me doubtful, but I certainly do not think that the success of the constructive movement will reduce the amount of drawing now taken in schools. On the contrary, the amount of drawing devoted to and preparatory to the actual making of things will, I think, increase. Above all, there will be an increased tendency to ask how far the drawing will finally have a meaning in some completed product. Let it not be supposed that this is a doctrine of bare utility. Ruskin has told us again and again that ornament, unless it really subserves use, is false and ugly, and no one can suppose a Ruskinian doctrine to be a dictum beloved by disciples of Gradgrind, to whom all ornament is a waste of time and effort, both on the part of the person who makes it and the person who admires it. We have, then, to make things, and to make them beautiful. Much of the so-called teaching of "design" will either disappear or be modified, so that it becomes "design" in the true sense of the word—that is, ornament expressing itself through the function of the thing, and limited and conditioned by the material of the thing which it is supposed to ornament.

All this, I know, is a long way from the kindergarten, but Americans think it is possible even there to make a beginning of ornamental drawing; and I feel that the description of an actual lesson heard by me in one of their training colleges will make clear to English teachers, far better than any lengthy disquisition of my own, what American pedagogy aims at in the ornamental drawing of the kindergarten. My readers are perhaps aware that it is not unusual for kindergarten teachers in the United States to be trained in the ordinary normal schools, side by side with other teachers, and to pass the same examinations for entrance to these training colleges. I select a lesson heard in Chicago as quite typical of American pedagogy.

CHICAGO, ILLINOIS, TRAINING SCHOOL FOR TEACHERS.

Twenty-one women students were present, belonging either to the first or second college year. They were working for the kindergarten licence (we should say certificate or diploma). Most of them were nineteen or twenty years of age, though one or two were younger and one or two were older.

This was a lesson in the method of teaching ornamental drawing to children in kindergartens, who are certainly young for this work, since after six years of age they are required to pass from the kindergarten into Grade I. The teacher commenced with a few general instructions.

"Let your children," she said, "mix some Indian ink, and draw with the brush as freely as with the pencil. Do not say they cannot do it, but inspire them with confidence and let them try; we shall to-day try this for ourselves. Much early work with children should be free; let them mix colours as they like and make rainbows, as you may call them. After some preliminary work of this kind, choose a colour—say, red or orange—and wash a paper with it, not necessarily all over. Then ask what the children would like to draw or paint on this background. Some will say a steam-engine, some will say a man and horse [in English we always say horse and man, putting the quadruped first]. When you have washed in your background, set your paper aside to dry."

At this point I raised two questions. First, I wished to know whether this spontaneous work was wholly relied on for the teaching of drawing; and secondly, whether there were no preliminary instructions in the methods of holding and using the brush. The students had already had experience with children, and I asked them if they knew the way which the children would spontaneously adopt in holding the brush. They were not clear about it. I suggested to the teacher that they would hold their brushes very near the working end, as many of the students were doing. She thought, however, that this method of manipulation on the part of the students was due to the small size of the papers they were using, which were only 9″ long and 4″ wide. Much larger papers were always given out to the children. "The methods of manipulation will be taken later. I am now only teaching them what to do; to stop for method every time would take too long." This was not altogether an American attitude towards method,

and I could not help thinking that the students would have a strong tendency to repeat the process with children in the very way in which they had themselves done it previously. Disquisitions on method, taught separately, would not, I suggested, have much influence on the particular process. I think the teacher agreed with me, but she, of course, felt the difficulty as to lack of time in a way which I could not.

A few more general instructions by the teacher led the way to the second section of the lesson. "Let us consider for a moment," she said, "what purposes we have before us. First, there is the expression of an idea—this we have briefly touched upon; and secondly, there is dexterity with the brush. The latter may be attained by means of 'blobbing' and 'spot and stroke' work. The blobbing is especially of value in giving the child practice in steady, slow movements."

At this juncture, a very simple exercise in 'blobbing' was done by the students in accordance with the instructions of the teacher: it calls for no special comment.

"The next paper," she proceeded, "is to be used for 'spot and stroke' work. There must be no going over the strokes twice; a quick, firm, and accurate movement is required first time. Divide a fresh sheet of paper into three pieces; mix some green paint with plenty of water; take one-third of the paper, with the long side parallel to the long edge of the desk, and draw with the brush, in one continuous movement, a broad, green line from top to bottom; then draw another, and another, parallel to the first. Take another third of the original sheet of paper; make four spots and four blobs round each spot (Fig. 1); this will give us a very simple floral design.

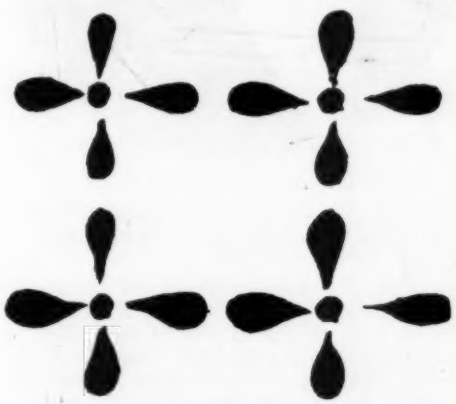


Fig. 1.—Much reduced in size.

"Now, having made our simple floral design, let us put it in on the paper on which we have already drawn the stripes or strokes, arranging it symmetrically along and between the lines."

When this had been done, the students were told to take the third and remaining portion of their paper, and draw the stripes or strokes diagonally. The "floral design" was then inserted as before (Fig. 2), with an effect which the students generally felt to be more pleasing.

Fig. 2.—Much reduced in size.

"I suggest," said the teacher, "that you ask the children at each step whether you shall arrange the design in this way or that way; they will, in the majority of cases, choose the simplest ways first. At the next stage give a further exercise on another paper, and tell the children to draw any design they like, provided it consists of strokes and spots. You may do this yourselves." The students set to work and produced some variations on the above patterns, but none of them achieved any distinction. My readers will remember that the American lessons in English almost invariably left something to the spontaneity and ingenuity of the children—something not merely repetitive but different and individual, to be done each by himself without reference to others. It is a good feature of American method, which, in this respect, we are tending to imitate more and more, though one must admit that the results, as in the case of these students in training, are frequently disappointing.

The teacher deplored the lack of artistic initiation both in children and students, and recommended the latter to go and see the Japanese designs which were permanently exhibited in Chicago by the Art Education Society. "In those," said she, "you will see how very simple means may be used to produce striking and artistic effects. Now let us return to our washed-in background."

The papers, having now dried, were again taken up, and the outline of an irregular row of houses drawn in Indian ink with the brush. I did not notice many skyscrapers, nor any specially American features; but the results were not inartistic, and I recommend the exercise as interesting to children, though hardly to children of kindergarten age—a kind of background sunset effect is produced which is certainly pleasing. It is, of course, however, an artistic and not a constructive effect.

A few words of general comment closed the lesson. "Let the children choose from among the good colours only, and with washes of these you may get a kind of free painting which is not inartistic. Our purpose, both in the free drawing and in the spot and stroke orna-

mental work, is to lay hold of the spontaneous activity of the child, and induce it, if we can, to do something which it feels to be original and is not inartistic."

The ideal is most praiseworthy, but I am not so sure that the teachers who read the account of this lesson will agree that it will attain its object. But granting the means to be the right ones, we can only feel that it would be well for our training colleges to take up more thoroughly the work of training in method by actual detailed operations in all subjects of instruction, and especially in manual and constructive work. The illustration of the method with a class of young children would have been better still, but perhaps that was to come later.

I must say one word as to the conduct of the lesson. The teacher's distribution of attention was remarkable; no irrelevant movement appeared to pass undetected. "Miss 'A,' you have too much paint on your brush; Miss 'B,' your paper is the wrong way round," and all very quietly and effectively, even whilst she was discussing with me disputed and vital points in method. American teachers are more accustomed than ours to conduct their lessons and instruct visitors at one and the same time. (*To be continued.*)

CORRECTION.—In Mr. Winch's paper on Herbert Spencer, printed last month, Mr. Harold Cox is described as member for Leicester instead of Preston. The Editor wishes to apologise to his readers in both constituencies.

A VISIT TO THE STANLEY TECHNICAL AND TRADE SCHOOL.

BY ARTHUR W. BULL.

BEFORE framing our courses of constructive and technical work in schools, it would be well to place before us an ideal towards which we may direct our efforts. We may not be able to reach or even to approach our ideal, surrounded as we are by restrictions and codes and ratepayers; but being cognisant of it, our efforts, however meagre, will be solely directed to one definite end.

Such an ideal may be found in the system adopted in the technical and trade school at South Norwood. Of course, the conditions upon which this school is carried on may never exist in schools controlled by local education authorities. Unrestricted in every sense, the founder, Mr. W. F. Stanley, is carrying out a scheme of constructive education which is the result of a life-long study. He is an educationist to his finger-tips, and having had wide experience as an employer of labour, is doing his best to produce skilled mechanics who may be able to compete with the ubiquitous foreigner, and men who will be a credit to the British nation.

In the first place, the building is the outcome of years of thought. It has been constructed on the most advantageous plan for the scholars and staff who work there. Apart from the classrooms, where ordinary subjects are taught, may be seen a capacious workshop, well equipped with lathes, benches, and tools necessary for the practical work carried on there. Here the boys, whose ages range from twelve to fifteen years, are divided into sections, each section doing work which depends mainly upon the progress made by the scholars.

A section of boys, recently admitted, were at work upon elementary woodwork, not as we know it in our manual classes, where lads are taught to make certain models of little or no intrinsic value, but upon joints and various processes used every day in the workshops of builders, cabinet-makers, and the like.

The next section were also working in wood, but were fitting together stools and benches, making cupboards to contain specimens of their own work, making seats for their own play-yard, turning handles for their tools or banister rails for a staircase in their own building.

The most valuable work from an educational point of

W. F. STANLEY, ESQ., J.P.*

view, however, is the construction of models to illustrate the mechanical and mathematical laws taught in the classroom.

A third section, the most advanced, are at work on metal. Under the guidance of a competent engineer, there is no limit to the variety of work done. Here the boys make and sharpen their own tools, construct nuts, bolts, screws, and fittings for their various machines. They will fit you up with a lathe, practically the whole of which, from the brass castings to the smallest screw, has been made, finished, and fitted together in a very workmanlike manner by the boys themselves. No, these machines and fittings made at the Stanley School are not toys. They have a high commercial value, and would do credit to any firm of mechanical engineers.

The correlation of the work in the classroom with that in the workshop is one of the most valuable features of the school as an educational institution.

* Just before going to press we received news of the death of Mr. Stanley at the advanced age of eighty-one years.

THE WOODWORK SECTION.

At 10 a.m. you may see the boys solving on paper the mechanical advantages obtained by the use of levers, inclined planes, and other mechanical contrivances. At 11 a.m. you may see the same boys in the workshop constructing models to illustrate the same laws. Early in the afternoon the mathematical master will be explaining the mysteries of Euclid's problems, while later the lads will be making models illustrating the same facts.

The first idea seems to be to make the boys think, and after that to give them an opportunity of carrying their thoughts into practice. You will naturally say that this could not be carried out in an elementary school. Under present conditions this is admittedly so, but I will endeavour in a future article to suggest to what extent a scheme of this nature could be carried out.

You will also ask, "What are the results of this teaching?" The immediate results will be found in the actual process of training. When you notice the entire absence of humdrum monotony, or of the lethargy displayed in many of our schools; when you see the keenness with which these boys work—a keenness which brings them to school two hours before, or causes them to remain two hours after the regulation times, in order to finish certain work they have in hand—you will be convinced that there is great good in the system.

These boys are making men of themselves by the simple process of *thinking* and *doing*. Apart from the commercial value which may arise from their training, their reasoning faculties and their manual dexterity have increased in power to an extent which better fits them for the battle of life, whether they become expert mechanicians or not.

With a freedom of thought and action—a characteristic trait of the founder—comparatively useless subjects have been omitted from the time-table. As boys are not admitted to this school until they have passed through the fifth or sixth standard in an elementary school, it is taken for granted that they have sufficient knowledge in Scripture, History, and kindred subjects to enable them to pursue their own studies in these directions unaided. Consequently only such subjects as Drawing, Science (particularly Physics), Mathematics (practical), and Physical Geography are undertaken.

"The boys enter the school lazy" (quoting the words of the headmaster). "They generally write in a slow, cramped fashion, and are careless in the extreme." These characteristics they lose in a very short time. They are taught to be industrious and painstaking. At the same time they must think and act rapidly. In spite of the fact that they spend half their time in the workshop, and that several subjects are omitted from the curriculum, their theoretical work is well in advance of that produced by boys of a corresponding age in an elementary school. Enthusiasm marks the work throughout, from the founder down to the most recent recruit. Whether the scholar be copying a spray of flowers for future use in designing, or calculating the power required to lift a certain weight, or drawing out an iron bar in the forge, the same thoroughness and enthusiasm are displayed.

Before concluding, mention must be made of the fact that no class exceeds thirty in number. This is of fundamental importance in considering the advisability of introducing constructive work in schools.

In the opinion of the writer, no teacher living can give thorough individual attention to a class of more than thirty. Hence if the introduction of constructive work is to be seriously considered, a reduction in the size of classes is imperative.

SPANNING THE GULF;

OR, KINDERGARTEN INSTRUCTION FOR THE UPPER STANDARDS.

BY H. G. STYLES.

AT the eleventh Annual Conference of Teachers held under the auspices of the London County Council at King's Hall 1908, Dr. Frederick Rose, assistant educational adviser to the London County Council, remarked, "There can no longer be any doubt about the necessity for more open-air school instruction;" and in support of this he quoted as follows from Comenius: "As far as possible, men are to be taught to become wise not by books, but by the heavens, the earth, oaks and beeches—that is, they must learn to know and examine the things for themselves, and not the testimony and observations of others about the things."

It is stated that one of the anonymous witnesses who gave evidence before the Consultative Committee of the Board of Education on the question of higher elementary schools described the method of teaching in elementary schools as "chalk and talk." Quite so, but who is to blame? Teachers as a body have all along testified to the uneducational methods emanating from Whitehall as found in Codes, Suggestions to Teachers, and Circulars. They, together with their unfortunate pupils, have been

the unwilling victims of a pernicious system. The children have asked for bread, and the teachers have had to dole out the official stone. However, at length signs are not wanting that the dawn of a new era in educational administration is breaking. The so-called New Constructive Movement, which aims at making the primary teaching touch everyday life at all points, is undoubtedly the germ of emancipatio... In a few years both teacher and pupil will be able to say with Longfellow :—

> "What a glory doth this world put on
> For him who, with fervent heart, goes forth
> Under the bright and glorious sky, and looks
> On duties well performed, and days well spent;
> For him the wind, ay, and the yellow leaves,
> Shall have a voice and give him eloquent teaching."

In alluding to the difficulties associated with open-air instruction, Dr. Rose referred to the size of the classes. These, he agreed, must be *small*. We as teachers can think of other difficulties—for example, the want of liberal staffing, the lack of freedom in drawing up and carrying out schemes of instruction, the apathy of some teachers towards modern methods of instruction, and last, but not least, a lack of definite ideas as to the scope and limitations of open-air instruction generally. Only those who have actually gone out with their pupils and tried for themselves what open-air teaching means are able to judge just what and how much should be attempted, and what failures and disappointments may be anticipated.

Professor Adamson in his work, *The Practice of Instruction*—a most valuable addition to recent works on modern methods of instruction, and one which every would-be up-to-date teacher should possess—refers to the need of a guidebook for open-air work. He says : "Where the class is large, the teacher will find it useful to supply the children with some form of guidebook, either hektographed by him or dictated to the children sometime beforehand. The guidebooks would contain, in addition to the map, general directions for the collection and transport of specimens, special points of interest to which the children should direct their attention, a clear statement of some problems which are to be solved, some sketches of objects unknown which they would find and might not be able to identify, and some blank sheets for notes and sketches. This guidebook may become most valuable in supplying data for subsequent class work."

But a guide for the uninitiated teacher is also very desirable if only to save the enthusiastic who desire to try the experiment from some of the pitfalls which assuredly await them. I believe many teachers are hesitating only because they cannot make up their minds what to attempt. "The unseen world," etc., compels them to cling to evils known full well, rather than fly to others they know not of. With apologies to the Warwickshire bard, I may say they are to a large extent well justified in their choice. The difficulties, however, though very real, are not insurmountable, while the results obtained amply compensate the teacher for his pains. The writer has encountered many of the difficulties hinted at and overcome them, and, with the desire to benefit those who may wish to try the experiment for themselves, offers the following suggestions with the assurance that is only born of success. The following scheme has been tested under anything but favourable conditions. The exercises have this merit—they have been actually worked by lads in a Grade I. London school, whose ages average thirteen years. Having stated this much, I propose getting to close quarters with the subject at once in a manner which will render the hints as practical as possible.

Materials Required.

Millboards, metric rulers, pocket compass, protractors, pencil compasses, squared paper ($\frac{1}{8}$" and millimetre squares), Ordnance maps, 45° and 60° set-squares, yard measures, sixty feet surveyor's tape, nature study notebooks, No. 14 exercise books, quarter imperial sheets of brown paper, clips for fastening paper on boards, twine, tracing-paper, crayon, coloured chalks (or paints), apparatus to be made by boys at manual centre (described later).

Having decided to give open-air instruction a place on the time-table, the head teacher will be called upon to submit his scheme to H.M. Inspector—verily "the unkindest cut of all." Schemes of instruction in History, Geography, Arithmetic, English, etc., fall to the lot of every head teacher, but to be privileged to commit to paper what a class of—say twenty lads—*shall* do, a mile away from school and under the dome of heaven ; to be able to cope with the vagaries of an English climate so as to prepare for a downpour of rain when your lesson for the day is "The Sun's Altitude" or "The Measurement of Shadows ;" to render an account of your experience during a period of about six months under the head of "Notes by Teacher,"—the very thought of all this fires you with ambition to be up and doing. In framing your scheme you will strive to represent the acknowledged four groups of educational activities—namely, the linguistic and literary, the mathematical group, the science group, and a group which is represented by some form of manual skill. Here is my own scheme, sanctioned by H.M. Inspector, and used in Hyde Park and Kensington Gardens.

General Outline of Scheme.

Historical.—The Achilles Monument, the Speke Monument, the Jenner Statue, the Victoria Statue, the Albert Memorial, the Tyburn Tablet, Kensington Palace, the Byron Statue, the Bronze Statue.

Material for Art Work.—The Achilles Monument, the Bronze Statue, the Albert Memorial, the ornamental work on the fountains and flower stands, trees, flower beds, bridges spanning the Serpentine, the park keepers' sheds, clouds, shadows in water.

Nature Study.—Trees and their characteristic features —for example, general contour, shape of leaves, markings on boles, catkins, seed-carrying by wind, colour of foliage in autumn—the flower beds in spring, summer, and autumn, indigenous trees and shrubs, evergreen and deciduous trees and shrubs.

Mathematical.—Pacing, shadows, sun's altitude, inaccessible heights and distances, direction with compass, areas of grass plots, elementary surveying, girths and diameters of trunks of trees, irregular shapes using ordinates, plans of flower beds, etc.

Proposed Work.

May 12.—Plan of flower beds, with characteristic colours and names.

May 14.—Study boles of trees and growth of stems from trunk, and draw with charcoal ; measure girths and approximate heights ; altitude of sun.

May 19.—Plan of flower beds, noting trees which have been imported from foreign countries ; pacing.

May 21.—A walk from fountains to Marble Arch, taking notes for future exercise in composition. (See scholar's notebook.)

May 26.—Drawing from boles, measurement of girths, etc.

May 28.—Draw ornament round fountains; commence plan of lakes.

June 2.—Take trace of a shadow; find magnetic declination; exercise on shadows and altitude of sun.

June 4.—Draw from bronze statue; pacing or shadow exercises.

June 9.—Altitude of sun; heights from shadows.

June 11.—Draw from bronze statue; areas and direction of objects with compass.

June 16.—Heights from shadows; draw Speke Monument after taking measurements.

June 18.—Draw from Achilles Monument; take measurements and approximate height; note Byron Statue.

June 23.—Survey of a path with plan of same; flower beds in gardens.

June 25.—Achilles Monument, finish drawing; flower beds on Park Lane side; mark in plan, noting colours and names.

June 30.—Survey of given area; plan of same with reference to Ordnance maps.

July.—Terminal examination. No open-air work.

September 1.—Contours of trees; collection of leaves for preservation; plan of given area; altitude of sun.

September 3.—Walk from fountains to Kensington Palace along broad walk to Albert Memorial, using Ordnance maps, and entering in notebooks.

September 8.—Flower beds in gardens; boles of trees and general contour; measure girths.

September 10.—Collect leaves; walk to Marble Arch; from Marble Arch to Achilles Monument to draw plan of flower beds; make notes for composition exercise.

September 15.—Inaccessible heights and widths; altitude of sun.

September 17.—Draw from ornament round fountains; continue plan of lakes.

September 22.—Same as on 17th.

September 24.—Shadow exercises; altitude of sun; areas.

September 29.—Draw from ornament around Albert Memorial.

October 1.—Flower beds; collect leaves; notes on walk.

October 6.—Draw bridge over Serpentine; take width.

October 8.—Survey of portion of park or gardens; draw plan to scale; compare with Ordnance map.

October 13.—Ornament round Albert Memorial; take measurements of base; width and length and height of steps, etc.

October 15.—Survey given area, draw to scale; exercises, using 45°, etc.

October 20.—Ornament round Albert Memorial; flower beds adjoining.

October 22.—Altitude of sun; shadow exercises; areas.

October 27.—Open.

October 29.—Open.

It is well to leave one or two dates "open" so that lessons which could not be taken owing to bad weather or other unforeseen circumstances may be attempted at a later period.

(To be continued.)

AGRICULTURAL EDUCATION.

BY W. FRANCIS RANKINE.

WORK FOR THE MONTH.

Soil Study.—The relation of the soil to water. How water enters the soil, and its storage. Percolation, evaporation, and transpiration. How water leaves the soil. The water content, and how it is controlled.

Plant Study.—Transpiration (sequence to the lesson given in the July issue). How transpiration is controlled—stomatic control.

Special Study.—Wheat as a type of the cereals. Correlation with lesson given in June on the grasses.

Soil Study.

The relation of the soil to water. In the two preceding papers we have dealt with the rise of moisture in the soil from the water table, emphasising the great importance of this process to the cultivator. It now remains to investigate the supply of moisture, and the means by which it is controlled. This latter consideration will lead us in a future lesson to study the drainage of the soil. Rainfall supplies the fields with moisture, which is stored up at depths varying with the physical nature of the soil. In this direction much interesting experiment is possible. Samples of light soils and heavy soils should be obtained, and the rate of percolation of water through them ascertained; of course it will only be possible with experiments of this kind to obtain comparative results. Percolation proceeds more rapidly in light soils, and thus it is that the water table is deeper in the case of these; this means that in such soils the water content is reduced, and consequently the conditions for plant growth are poor. On the other hand, the nature of the soil renders percolation an impossibility, and consequently a marsh is formed. Thus it is easy to demonstrate the dependence of one fact upon another.

Water escapes from the soil surface by means of evaporation, and also through the transpiration carried on by plants. The balance of these operations is well maintained in the fields: thus the presence of crops means greater facilities for transpiration, while the soil itself is protected from the heat of the sun, and evaporation is thereby checked. On the other hand, weeds rob the soil of moisture (see June issue). In open fields during hot weather much moisture is lost by evaporation; it is necessary to check this by the surface cultivations referred to in our last paper.

The variations in the behaviour of different types of soils towards water have another important bearing on plant life, in addition to the determination of habitat, since water is the food carrier to the plant besides being a food supply in itself. Moisture must be present around the root system in quantities just sufficient for the well-being of the plant. It should be pointed out that the presence of an excess of water leads to the lowering of the temperature of the soil. This may be determined by actual observation by means of earth thermometers.

Another interesting consideration is the space that exists in the soil between the particles. Naturally, this varies with the size of the particles, and it will not be difficult to show the relation of the water space to capillarity and percolation. Where the spaces are large—as, for instance, in the case of sand—percolation is more rapid than capillarity, and this explains why pure sand is useless for the growth of plants.

Plant Study.

Transpiration.—The work covered in our lessons is sufficient to indicate the need of some kind of control over the transpiration process, otherwise the water supply of the plant system would be exhausted. This is particularly true of those farm plants, such as the potato, which store up food, and also of others that contain a great amount of water. There are many instances of these plant devices, of which the following are the more general :—

1. *Stomatic Control.*—Previous to discussing this point the scholars should examine a few sections of leaf cuticle, and observe the distribution and shape of the stomata. The guard cells demand particular attention, since they are the mechanical agents that control the rate of transpiration. When charged with water they curve away from one another, and thus the stomata is opened ; when dry, the guard cells close, and thus transpiration is checked. Thus the process is regulated by the amount of water in the plant cells. The amount of water given off in any stated time is directly proportional to the number and size of the stomata on the leaf. In the case of large leaves it is often found that the stomata are very small ; this is the case with the cabbage, which presents a large leaf area.

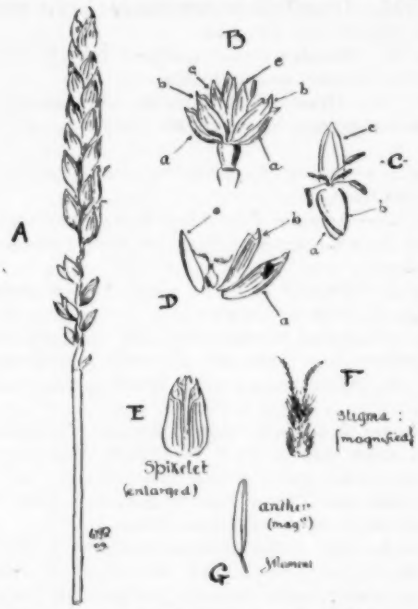
2. *Leaf Modification.*—There are numerous instances of this, and each is full of interest. The size of the leaf has much to do with the amount of water transpired, and thus it is that, in general, plants which grow in marshy places, and therefore demand rapid transpiration, have large leaves ; in general, plants which grow in dry soils, and therefore must conserve the little moisture there is available, have small leaves. Often we note plants with narrow leaves, and usually these are naturally partial to a dry habitat. A list of these should be compiled. In the case of the cabbage family a wax-like bloom is excreted upon the leaf, and this tends to check loss of water ; it will be observed that this deposit is more noticeable in the early morning than at any other time of the day. Another interesting development is the thickening of the outer skin of the leaf as exemplified in the evergreens, which, on account of their exposure to winter frosts, must be protected against the danger of freezing. Hairs and fine spines are also developments to prevent excessive transpiration ; these prevent too much heat and light from falling upon the leaves, and heat and light are the two chief stimuli of transpiration. The leaves of the vegetable marrow should be examined, and also those of the turnip ; both of these plants are remarkable for the great amount of water stored up in the fruit of the one and the stem of the other.

Outlines of a Lesson on Wheat.

The wheat plant yields a long list of lessons extending throughout the year ; at this time the consideration of the flower, its structure and fertilisation, and the formation of the fruit or grain, form a seasonal study. The following lessons are possible :—

(1.) *The seed :* its germination and time of sowing. (2.) *The root system* and food absorption. (3.) *The stem :* nodes and the internodes ; tubular stem and the sheathing of the leaf base. Comparison of stems and sheathing habit with those of barley, oat, and rye. (4.) *The ear :* the flower, feathery stigma, and stamens (compare with lesson on grasses) ; glumes and awn. (5.) *Fertilisation :* self-fertilisation and cross-fertilisation. (6.) *The grain :* stages of ripeness. (7.) *Harvest :* field operations. Lessons 1 and 2 should be taken in the winter session, No. 3 in June, and Lesson 4 at the end of August.

The ear is composed of a series of spikelets arranged in pairs on the stalk or *rachis*. Each spikelet consists of a set of glumes or husks enclosing the flower. The removal of these glumes reveals the parts shown in the diagram. The outer glume is empty, and next to it is the flowering glume which, with the pale, contains the stigma and stamens. The stigma has a feathery style, so that the pollen distributed by the stamens, three in number, is easily caught. The glumes open for a few hours only, generally in the early morning ; the anthers of the stamens are pushed out and their



A. An ear of wheat with some of the spikelets removed. B. Spikelet showing arrangement of glumes—*a*, empty glume ; *b*, flowering glume ; *c*, pale. C. Spikelet opened to show arrangement of stigma and stamens—*a*, empty glume ; *b*, flowering glume ; *c*, pale. D. Dissected spikelet. E. Spikelet showing arrangement of glumes when closed. F. Enlarged stigma showing feathery styles. G. Stamen enlarged.

filaments lengthen ; their appearance indicates the approaching maturity of the flower. Fertilisation soon takes place ; sometimes the pollen falls on the stigma within the flower, and sometimes on those below. Thus in the wheat we find self-fertilisation and also cross-fertilisation. Another item of interest is the awn, which in the case of the wheat is usually rudimentary, while in the barley it is well developed. This awn or beard, as it is commonly called, is simply an elongation of the glume ; in some wheats there are well-formed awns, and these are known as bearded wheats.

In addition to the foregoing points, the question of soil is of interest, and it will be found that the Lias clay belt that reaches across England from Poole to the Wash is the corn belt of these islands. The times of sowing the seed should also be noted ; winter wheat is usually sown in October, and the spring wheat in February. The quantities used in sowing vary from two to three bushels per acre, while the yield may average thirty bushels ; with the aid of a seedsman's catalogue, the rural teacher may present some interesting arithmetical problems to his pupils.

AN EDUCATIONAL EXCURSION TO THE ISLE OF WIGHT.

BY E. G. BOWE, GLYN ROAD LONDON COUNTY COUNCIL SCHOOL, HOMERTON.

THIS educational excursion, which was carried through from July 3 to July 17, 1909, was a development of a series of monthly visits to places of interest in London, organised under Article 44 (*b*) of the Educational Code.

My purpose in writing these articles is not to dwell on this new phase of education, but to explain to teachers and others interested in education some of the methods and machinery employed in making the journey an accomplished fact.

I intend to give in as concise a manner as possible an account of the origin, preliminary arrangements, the probable programme for the fortnight, the handbook compiled by me for the occasion, the actual work done during the time, and other methods employed to endeavour to bring the venture to a successful issue. In the first place, as I have mentioned above, the idea sprang out of the educational success of monthly visits to places of interest in London, including the Tower, St. Paul's Cathedral, Westminster Abbey, the Houses of Parliament, the Zoological Gardens, the Tate Gallery, the Natural History Museum, etc., systematically organised during recent years; and I may say that this extension of these excursions is the first out of London from schools under the Council.

The Isle of Wight was chosen on account of its accessibility, and as a unique centre for places of great educational value in nature study, local history, and geography; and I feel I need not emphasise this view to readers who take an active interest in these subjects. Following on the choice of a centre, my next move was to make provisional arrangements for accommodating such a party; for my original intention was to take twenty-five boys, but as a matter of fact the number was really twenty-seven, not including myself and wife.

LESSON ON POND LIFE AT YAVERLAND, NEAR WHITECLIFF BAY.

I would like to mention here that one of the party was a Standard VII. girl, a sister of one of the boys, whose parents were willing that she should be included in the party to assist Mrs. Bowe in many little details which make the machinery of the domestic side of the work move more smoothly and efficiently. My next move was to get the initial sanction of the managers of the school.

Then I submitted a scheme of lessons for each of the school working-days to the Education Department.

SEARCHING FOR WORMS AND SEA-LIFE ON SHORE IN WHITECLIFF BAY.

This was sanctioned, and then sent to the Education Officer, to be further sanctioned by the London County Council Education Committee.

I wish to say here that in this I always received the greatest encouragement from the officials of the Council—a most valuable aid with which to begin the heavy work entailed in compiling the handbook (to be mentioned later), and carrying out the hundred and one details involved in an educational excursion of this kind. Before I mention the handbook more fully, I wish to give my readers an idea of the financial side of this excursion. Of course, it is easily understood that to take twenty-seven boys from London to the Isle of Wight for a fortnight, and visit the many places of interest on the island which we did, must entail a considerable expense, and it is this matter of expense which to many is the greatest puzzle.

Well, I am not in a position to give all details on this question of expense, as I feel I should be betraying a trust which was implicitly reposed in me; but I will endeavour to give my readers some information on this side of the undertaking. In the first place, it is not to be supposed for one moment that the London County Council subsidised the excursion. All the Council did in the matter of expense was to make a grant to be solely used in requisitioning materials for the transference of my work from London to the Isle of Wight.

The major part of the expense was borne by a voluntary agency, and each boy's share of the expenses was 7s. 6d., and I may say here that this contribution practically covered the whole expense of conveyance from and to Waterloo and maintenance during the fortnight. I may also add that, by a special favour for this year only, I was granted the loan of mattresses and bedding from friends interested in such work—a privilege which lessened a great deal of the expense. Space will not allow me to enlarge further on this side of my article, so I will hasten on to other important details.

I will now deal with the probable programme, drawn up by myself and submitted to the two authorities above mentioned, and I do not think I can do better than give my readers an actual copy.

PROBABLE PROGRAMME. TIME-TABLE OF LESSONS.

Day.	Time.	Outline of Lessons.
Monday, July 5.	10 a.m. to 12 noon.	Open-air introductory lesson on the Isle of Wight; topography of the island; study of Ordnance maps. A walk to Culver cliffs, noting the tide, formation of cliff, types of vessels; chat on erosion and its causes.
	2.15 p.m. to 4.15 p.m.	Afternoon on beach: search for sea-life; specimens for aquarium. Watch for sea-gulls, sand-martins. Note worm-casts; dig for worms; find small crabs left behind by tide. Look for jelly-fish, star-fish. Collect seaweed and anemones sticking to rocks; also search for limpets, periwinkles, and mussels.
Tuesday, July 6.	10 a.m. to 12 noon.	A walk over Shanklin Down to Luccombe Chine, returning by the chine along the shore. Note vegetation; collect wild flowers; specimens of foliage. Take notice of grain crops; pick specimens. Note the boulder-strewn shore at the foot of chine. Lesson on the formation of chines. Keep a sharp look-out to sea for objects of interest.
	2.15 p.m. to 4.15 p.m.	Afternoon spent in writing up notes of previous day's work and Tuesday morning's walk; the arranging of specimens of foliage, wild flowers, grains, and other objects found.
Wednesday, July 7.	9 a.m. to 12 noon.	Visit to Newport and Carisbrooke Castle. Lesson on Newport; its local history. Note the church; old town; chat about the river. Newport's connection with Charles I. Notice the market-place, of great agricultural interest; also Town Hall and Queen Victoria Memorial in High Street.
	2 p.m. to 4 p.m.	Visit Carisbrooke Castle. Note the ruins and position for a fortress. Site of a Roman camp. Note traces of British, Norman, and Elizabethan work; make a rough sketch from a part. Note outer gateway (1598), the moat, the gate-house, round towers and portcullis, the armoury, the keep, an ancient Celtic stronghold; well house; room where Charles I. was imprisoned; great hall opposite gatehouse, and other historical notes of interest. Return by train to Shanklin.
Thursday, July 8.	10 a.m. to 12 noon.	Copy out and arrange notes on Newport and Carisbrooke; copy a plan of castle. Teacher's *viva voce* examination on previous day's excursion in open air on the Shanklin Downs.
	2 p.m. to 4 p.m.	A visit to a quarry (Ventnor Road). Lesson on a quarry; soil, subsoil, and rock. Show how rocks are formed. Search for fossils, etc.; specimens; history of same explained.
Friday, July 9.	9 a.m. to 12 noon.	*St. Catherine's Lighthouse Day.* Depart by train to Ventnor. Walk by cliff to St. Catherine's Point. Note sandstone headlands; explore rocks. Look over lighthouse; note apparatus and candle-power of light; also fixed red light, engine, and siren.
	2 p.m. to 4 p.m.	Walk to Blackgang Chine. Note difference between it and Luccombe Chine; no foliage. Notice square blocks of sandstone and hollows worn out by stream. Return to Ventnor, noting rocks, red beach, and Cripple Path. Train from Ventnor to Shanklin.
Monday, July 12.	9 a.m. to 12 noon.	Visit to Shanklin Chine. The life of a stream; follow stream from source to mouth. Lesson on chines; how formed. Note vegetation and collect specimens; ferns; gather leaves; watch stream; waterfall. Note length of chine, and width at top and mouth. Taste water of chalybeate spring and note its properties.
	2 p.m. to 4 p.m.	Arrange specimens found in chine. Write up notes taken, and draw sketch, noting points in stream. Rest of afternoon spent on beach, noting clouds, sun, and wind (if any).
Tuesday, July 13.	9 a.m. to 12 noon	Visit to Roman villa at Brading and Whitecliff Bay. Train to Sandown. Walk to Brading (1¾ miles). Lesson on history of town; an old Roman villa. Visit church; note old tombs. Oglander Chapel. Visit cottage and grave of "Little Jane." See Roman villa and relics; explore village.
	2 p.m. to 4 p.m.	Walk to Whitecliff Bay. Note coloured sands in cliff; lesson on cliff and sandstone. Search for fossils in limestone and marl. Ascend to cliff from bay; note clouds and sea. Return to Sandown, and then train to Shanklin.
Wed., July 14.	9 a.m. to 12 noon.	Visit to Ventnor *via* Landslip, Undercliff, Bonchurch. Lesson on how landslips are caused. Note flora of Undercliff; also geology. Visit Bonchurch; note cross, roof and walls.
	2 p.m. to 5 p.m.	Walk along shore to Steephill Cove. Lesson on erosion; note the cliffs and rocks; gather seaweed and other sea specimens. Return by train from Ventnor to Shanklin.
Thursday, July 15.	9 a.m. to 12 noon.	Visit to Portsmouth and Southsea. Train to Ryde; cross by steamer to Portsmouth. Visit Portsmouth harbour, dockyard. Go over H.M.S. *Victory;* recall Lord Nelson's life. Inspect military and naval memorials on Southsea Promenade.
	2 p.m. to 5 p.m.	Visit a modern ironclad: contrast it with *Victory.* Note various types of vessels in harbour; also position and safety of harbour. Lesson on harbours, and their suitability for naval and commercial purposes. Return to Shanklin.
Friday, July 16.	10 a.m. to 12 noon.	Portsmouth notes to be written up; sketches of vessels to be drawn. Lesson on coast defence. Visit to a coastguard station.
	2 p.m. to 4 p.m.	Notebooks to be fully filled up and handed in. Rest of afternoon to be spent on beach, collecting final specimens of sea-life and making a general survey of shore. A sketch map of Shanklin Bay to be drawn.
		Teacher's Note.—Saturdays and Sundays will be spent in Shanklin as circumstances will permit. The boys will be invited to attend Divine worship at one of the churches. Sunday to be regarded as a day of rest.

I would like to explain that the reason for no prearranged programme for Saturday or Sunday is that these are not school days in London.

(To be continued.)

SPECIAL NOTICES.

FRENCH COMPETITION.

READERS are asked to note that the last date for receiving translations of the prose extract printed in last month's issue is *October 6.*

NEXT MONTH.

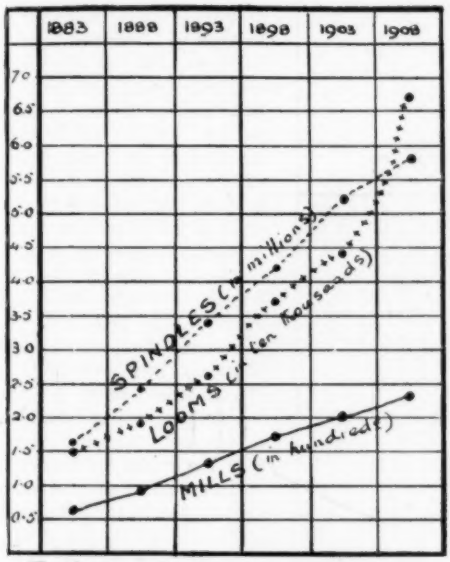
1. A charming Japanese tale for the Story Hour.
2. A helpful paper on Multiplication of Decimals.
3. An interesting article by Miss Mary Jacob, entitled "Our Lady of the Slums."
4. A review of the Departmental Circular on the Teaching of Music in Scottish Schools.
5. A practical paper on "Constructive Work for Standards III. and IV."

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

Cotton in India—The Manufacture.

THE recent publication of figures dealing with the Indian cotton industry has once more directed attention to the steady growth of India's chief factory trade. During the last twenty-five years the number of mills has increased from 62 to 227, spindles from 1,000,000 to nearly 6,000,000, and looms from 15,000 to close on 70,000. From the annexed diagram two points are very noticeable—(1) the steadiness of the progress all through (there is nothing like a set-back in any one of the six years, each year being the end of a five-year period); and (2) the development of weaving in the last five years, which appears from the increase of looms in 1908 as compared with 1903. During the



The Indian Cotton-manufacturing Industry.

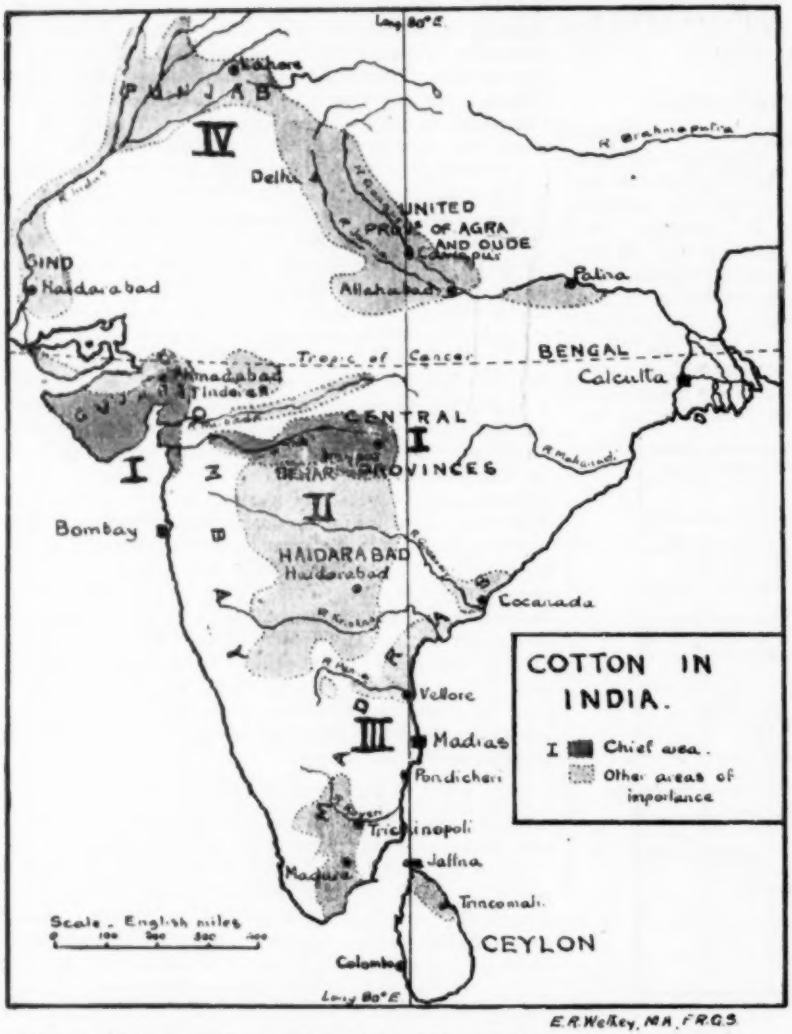
Progress during last 25 years in Mills, Spindles and Looms

twenty years ending in 1903 looms increased by some 28,000, but in the next five years they increased by no less than 23,000. The *Times*, commenting on this advance, says: "It is clear that the vicissitudes experienced in the foreign markets for yarn have induced the mill-owners to use more of their own yarn for weaving cloth, and this policy has been strengthened by the *Swadeshi* movement." Weaving, however, is still of somewhat local distribution in India. Outside of Bombay Presidency there is not much, save in Cawnpur, Nagpur, and Madras, while there are spindles in every province. The whole industry, indeed, is largely centred in the Bombay Presidency, which might be taken to mean almost Bombay city and perhaps Ahmadabad. Seventy-one per cent. of the mills, the same proportion of the spindles, and at least eighty per cent. of the looms are on this western side of India. The causes of success are not far to seek. Plenty of raw material and markets at hand, near, if dear, coal, and a good supply of cheap labour are the chief of them. But the factory work has had one untoward result. It has largely diminished the famous hand-spinning and hand-weaving industries for which such places as Dacca were originally famous. India has the credit of being the first in point of time of all cotton manufacturing countries. Indian books wrote of it eight hundred years before the Christian era. This is five hundred years before Herodotus, who may be taken as the first European "authority," spoke of a tree which he had heard of as growing in India and bearing, instead of a fruit, wool like that of a sheep (see Chisholm, *Commercial Geography*, p. 110, 7th ed.). It was not till the times of the East India Company that cotton goods could be said to be in general use in the United Kingdom, and it was the Company which was in a measure responsible for setting the fashion with its importations of "calicoes" and "muslins." Much of this original work has gone, was bound to go, before the onslaught of machinery. All the same it is a mistake to regard Indian handwork as dead, or even dying. Some authorities assert that the output of work of this nature is even now three times as great as that of the mills, and that the number of hand spinners and weavers still working cannot be less than 6,000,000. The Indian factory product finds its chief market—apart from a large home consumption of its output—in China (where Japan has become a serious competitor) and East Africa, to the loss of Manchester. Indeed, in the coarser yarn and goods India holds its own easily against any British rival in Eastern markets. In finer work it is still behind; of its total output of yarn not more than eight per cent. or nine per cent. is over 25's (cotton numbers, or counts = hanks, 840 yards, to the lb.). This percentage is said to be increasing slowly but surely.

The Raw Material.

Where, then, is grown the raw material for so large and flourishing an industry? An inspection of the "cotton map" of India shows four distinct areas, though generally speaking there are few parts of the great dependency which do not grow some cotton. These four divisions are—I. A great belt across the north-west Deccan, beginning in Gujarat and extending up the Tapti into the west of the Central Provinces. Immediately north and south of this belt comes II., in the valley of the Narbada, in the rest of Berar and the Central Provinces, and in the dominions of the Nizam. These two divisions, and more particularly No. I., are responsible for the major portion of the Indian crop. It is here that the famous "black soil" is found, notorious alike for its fertility and its capacity for retaining moisture, the last an especially valuable quality in such a climate as India's. No. III. comprises various detached areas in Madras Presidency, notably one on the lower Godavari, another on the Krishna and Penner rivers and the tract intervening, and a third in the south-east corner of the peninsula, which is continued across the sea into the north-east corner of Ceylon. No. IV. owes its existence largely to irrigation, and is seen on the map as a narrow semicircular belt extending from Sind up the Indus valley into the Punjab, and thence over the Ganges and Jumna watershed, and down the two rivers as far as Allahabad and beyond to Patna.

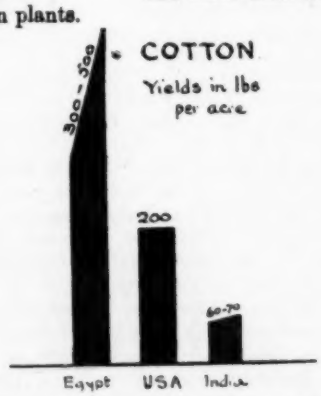
Altogether there are some 15,000,000 acres (some authorities say 20,000,000) under cotton alone in India. This is about equal to half the acreage under *all* crops (including pasture) in the United Kingdom. As the value of the cotton crop is estimated at some fourteen



or fifteen millions sterling, and that is but the starting-point of the manufacturing industry, the importance of cotton to India is manifest. About sixty per cent. of the crop is kept at home, and the remaining forty per cent.—chiefly from division I. above—goes east more than west.

The Influence of Climate.

On all products of the vegetable kingdom climate naturally exercises an all-important influence, and on none more so than on cotton. A good object-lesson may be taken from India. The influence may be worked out in the sowing of the seed, in the growth of the plant, and in the ultimate yield of the crop. In the United States cotton is sown generally in rows, and the earth is often ridged up to facilitate the escape of moisture. In India, where the rainfall is for the most part scanty, there is no necessity for this ridge method, and the seed is sown broadcast. As to the growing of the plant, cotton is peculiarly a *sun* plant. To cultivate it successfully it requires a long summer and a moderate supply of moisture. India supplies the first condition with ease, but it is very partial in its distribution of the second. It all depends—as everything in India depends—on the monsoon. And as the principal cotton region (No. I. on the map) lies mainly on a portion of the Deccan *behind* the Western Ghats, much of the moisture is drained out of the rainclouds before they reach the cotton area, and the water supply is accordingly scanty and often quite deficient. Outside the monsoon area, in the Punjab for instance, recourse has to be had to systematic irrigation. Lastly, the Indian yield is poor in quality when compared with that of the other two great cotton countries of the world—United States and Egypt (see diagram). The fibre, moreover, is more brittle, and the staple is shorter. Climate is not alone to blame here. Inferior methods of cultivation, less use of fertilisers, fewer new lands to turn to as the old become exhausted,* are three obvious causes why the yield of Indian cotton per acre is far below that of the United States. But climate matures the Indian product too quickly for a good length of staple, while want of care in the selection of seed completes the process of deterioration. It is well known that Indian seed sown in America always produces a better quality of cotton than at home, and that American seed sown in India regularly degenerates. And yet India, Indo-China, and the Eastern Archipelago are the original habitats of the best and most cultivated species of the cotton plants.



* The total area of the cotton region of the United States, says Chisholm (*Commercial Geography*, p. 112), is estimated at upwards of 700,000 *square miles*. Compare this with the Indian acreage given above, and with the square mileage of the *whole* of the United Kingdom (121,000).

NOTE.—The Editor regrets the enforced curtailment of Mr. Wethey's "Notes," for which more space will be available next month.

Our Art and Handwork Section.

PAINTERS AND PICTURES.

BY W. E. SPARKES.

XI.—LORD LEIGHTON, P.R.A. XII.—MRS. ERNEST NORMAND.

DECORATIVE PAINTINGS.

DECORATION first sprang from interest or affection. The primitive man, proud of his bone weapons, scratched on them the animals of the chase; and, viewing his clay pottery with equanimity, took a small stick and pressed on the still soft surface a simple geometric pattern. As his skill increased, he would doubtless smear coloured earths on the rocks that formed the sides of his cave dwelling; while the more advanced builder in rough wattle would ornament the wooden posts, as the Maoris did, with more intricate pattern.

Decoration and structure advanced hand in hand. The earliest civilisations whose remains are extant stand in proof. Egyptian temples and tombs had frescoed pictures along their fronts or in their interior rooms; and these pictures gradually took on a more permanent character when converted into carved forms which were also brightly coloured. The Assyrian kings ornamented their state-rooms with carved bands in stone, boastfully putting on record their prowess in battle or in the hunt; the Greeks and the Etruscans painted and carved their temples nearly three thousand years ago—an art which attained its highest reach in the Greek's greatest days five centuries before Christ.

From that day throughout the ages there has been

"WHITTINGTON, AS LORD MAYOR, FEEDING THE POOR."

(From the fresco by Henrietta Rae (Mrs. Normand), in the Royal Exchange, London. By permission of Messrs. Hildesheimer and Co.)

no break in the continuity. Rome learnt from Greece: the height reached in wall decoration is evident in the villas of Pompeii, wonderfully preserved by the disastrous lava; and the early Christians, escaping to the labyrinths of the Catacombs, and converting those gruesome underground shades into chapels, painted symbolic pictures on the rocky walls. A later Christianity, settled in power at Byzantium (Constantinople), carried the art of decoration perhaps to excess, covering every available space with costly mosaics.

And so the stream ran on placidly right through the Dark Ages, and when the sun at length rose and dispersed the mist, the walls of churches began to blossom with primitive but earnest paintings, putting on record the lives of the saints, and attesting at the same time the deep religious feelings of the artists—among them such priests as Fra Angelico, who painted kneeling, in the attitude of prayer.

Afterwards came the new birth of learning—the Renaissance, with its marvellous buildings and mighty names in art—Michael Angelo, Raphael, Leonardo da Vinci, and a hundred others.

Never were such frescoes seen before. Pope Julius the Second, opening his little Sistine Chapel in the Vatican to Michael Angelo, bade him picture there on the walls all the deathless prophets from classic and scriptural lore—the Sibyls, Isaiah, Ezekiel, Jonah—while the tremendous "Judgment Day" should cover the ceiling with its countless multitude rising from the dead.

It became a tradition. Pictures sprang up everywhere in the churches, in state buildings, in palaces, in private houses; not only were the windows still more glorified than they had been in the early days of the Church, but illuminated manuscripts made way for rich designs in printed books.

The Reformation broke rudely into this complacent stream, and, in Protestant countries at least, wall-painting disappeared from the churches, though it still had its place in municipal buildings.

During the mid-Victorian age wall-painting came into favour again. At the rebuilding of the Houses of Parliament, in 1842, cartoons were designed to cover the walls of the corridors. Watts (as was pointed out in a former number *) received the first prize for his design—an event which enabled him to visit Rome, and helped him to pursue the studies so important in their results. That fine artist, seeing the poetry of a railway station—a vision not patent to directors and shareholders—offered to paint a fresco for the new Euston Station; an offer declined with thanks and covert smiles.

In 1895 Leighton pointed out to the authorities that the twenty-four gray, perpendicular spaces, with rounded heads, along the walls of the Royal Exchange, lent themselves admirably to decoration, and that such an opportunity would not have been lost by the city fathers in the great period of later Italian art—the days of Michael Angelo. He converted them to his view, and had little difficulty in inducing them to accept, as a gift, his offer of the first painting, "Phœnicians Trading with Ancient Britons." Other paintings followed, among them Mrs. Normand's "Whittington, as Lord Mayor, Feeding the Poor."

Now it is very interesting to consider how one should look upon wall-painting generally. Should the pictures differ from "easel" pictures that are framed, and can be placed in any position one pleases? And if so, in what ways should they differ?

* *Practical Teacher* for February.

The Differences between Wall-paintings and Ordinary Pictures.

Wall-paintings are decorations. Evidently, if they do not decorate, they are out of place. A wreath of roses painted on a man's silk-hat might lend some interest to that structure, and would probably attract attention, but the least fastidious might reasonably demur at considering this a fit decoration. Yet the unsophisticated Hindus see nothing incongruous, but rather complimentary, in hanging wreaths of real flowers about the necks and headgear of their friends. But this would not be strictly in accordance with Western ideas, and is but another proof that, after all, taste is governed by occult laws that change with time and climate.

Now European art is continuous. It bears the racial marks that have persisted from the early Greeks and Romans until now, so that it is binding on us to consider how wall-paintings have been considered in the best periods.

They must decorate the walls; they must beautify the architecture, and not be out of harmony with it. That is to say, if their lines or forms or colours clash with the colours, forms, and lines of the building, there is certainly danger if not disaster.

For this reason the great wall-painters have maintained a *balance* in their compositions. Consider for a moment such a painting as Raphael's "Madonna." The Virgin and the Child stand high in the picture; on either side is the figure of a saint; while below, and in the centre of the lower line, are two cherubs. Take this principle, and apply it to all the masterly paintings that were placed above the high altar in Catholic churches, apply it to the stained-glass windows in similar positions, and you will find that, however complicated the composition, there is a balance in the masses. And even in the pictures on the side walls they are bound and controlled by the architecture.

This, too, is quite apart from the subject of the picture. As one enters the church, one is unable to see what the subject is at the first glance, but sees an agreeable massing of forms which harmonise with the surroundings.

Evidently the colour must follow the same rule. If the walls are yellow, it would be midsummer madness to use bright pinks and greens to jar with that strong colour; while, if they are stone gray, the harmony should be made by soft tones. No good wall-painter neglected this precaution. If he painted on a canvas ground to be afterwards placed in position (as Leighton did in his "Phœnicians"), he first took the surrounding tones into earnest consideration.

The masses and the colours must harmonise with the architectural forms and colours as seen from a distance; but as one approaches to see more clearly the lines that run about the picture—the swing of the drapery, the position and trend of the limbs—these must not be too violent in action; they must flow easily about and among the grateful masses and the richly-combined tones.

Even when one goes a step further to look into the detail, there are many traps into which clever artists who have forgotten the essentially decorative character of wall-paintings have frequently fallen. Figures seen foreshortened—with their bodies or limbs projecting

towards the spectator—may be perfectly right as seen from one point on the floor below, but altogether wrong and out of drawing if the view is nearer or more remote; for which reason the finest decorative paintings on walls (it is not so noticeable on ceilings, because one must stand immediately under the figures to see them properly) have their figures seen with the limbs running mainly in the direction of the wall surface, and not foreshortened more than necessary for the action.

The wall-painter, then, has difficulties to contend with unknown to the painter of "easel" pictures.

Of course the subjects must be congruous to the building—religious in character for churches, historical for Houses of Parliament and municipal buildings, or at least symbolical of human progress and endeavour. It will be interesting to consider how Lord Leighton and Mrs. Ernest Normand (Miss Henrietta Rae) have treated these wall-paintings for the Royal Exchange as decorations.

"PHŒNICIANS TRADING WITH ANCIENT BRITONS."

(From the painting by Lord Leighton, P.R.A., in the Royal Exchange, London. By permission of the Gresham Committee.)

"PHŒNICIANS TRADING WITH ANCIENT BRITONS."

(By Lord Leighton, P.R.A.)

When Lord Leighton offered his design for the Royal Exchange, he determined the scale of the figures, since it would be quite out of keeping for coming designers to paint larger or smaller figures than his in spaces equal in size and placed in similar positions. He also wished that all the designs should contain the curious oak-leaf wreath placed above his composition, a stipulation that some artists have disregarded—unfortunately, I think, because his meaning was clear; the repetition of this circle at equal heights from the ground around the room would have a decorative effect not appreciated when only one cartoon is considered by itself.

Lord Leighton, in effect, saw in his mind's eye all the spaces filled with paintings; he saw the groups extending round the room at equal heights, for which reason he made his own to fit into an oblong; he saw a continuous band bound by the upper line of this oblong, and so preserving an architectural severity which would harmonise with the building, while the figures themselves could be grouped as the artists wished. This severity would be maintained by the twenty-four equal oak-leaf wreaths spaced at equal heights and equal distances.

It is a pity that some of the designers had not Lord Leighton's deeply-studied sense of decoration—a sense which he had cultivated by long and careful examination of the best examples in the world; and if, when all the spaces are filled, the general effect shall be unsatisfactory—as it must be—Lord Leighton must not be blamed.

Every one exclaims how widely this design differs from his better-known paintings, though the reason is not far to seek.

The attitudes are strangely wanting in the foreshortening apparent in such pictures as "Summer Moon," though in his large *decorative* paintings he maintained a similar "flattening" in the pose.

In the "Phœnicians" the only foreshortened figure is the woman crouched on the ground, though here the limbs are purposely hidden. Such a picture remains true in drawing when seen from near or far; but this cannot be said of Mrs. Normand's design, as you may see by holding the page first at a distance of two feet, and then placing it four feet away; the greater the distance the more gigantic the youth with the bread becomes, and the more insignificant Whittington and his wife—a capital error never committed by the great Italian, French, and German designers of past time.

Now examine how Lord Leighton has massed his figures. The Phœnicians compose an upright and dignified mass strongly in contrast with the broken and agitated group on the left—a grouping which, in itself, immediately suggests quiet, subtle civilisation dealing with a vehement, thoughtless, and unreasoning race—a grouping instinct with life. It interests for itself alone even before one can come near enough to read the subject.

But within these groups there is a fine play among the lines. The long robe, dyed with the famed Tyrian purple, sweeps down and across in ample folds, a wave-like movement which Leighton had learnt from Greek sculpture. This is taken up and continued through the inclined ancient Britons, first through the kneeling figures and so onwards to the standing hunter. This wave-like motion is checked and again contrasted by the extended arms of the Britons, in lines which, if continued, are seen to flow into other curves on the right.

It is not possible to do more than indicate the harmony in colour—the purples, reds, and blues so combining that they make a rich mosaic in themselves, a decoretion for the gray walls quite apart from the subject. Undoubtedly, considered in relation to this cartoon alone, the wreath seems strangely crude, though its orange ground and green leaves enrich the whole cartoon in colour; but, repeated twenty-four times round the room, it would have a particularly enlivening effect, like painted glass in a church.

Lord Leighton's ancient British women are quite classical in feature and graceful in form. It must be remembered that he thought the office of art was to make beautiful things. In the portrait he painted of himself for the Uffizi Gallery, the background is a part of the Parthenon frieze, perhaps the most beautiful ancient Greek sculpture in the world. This was done with a purpose—to show that he was entirely in sympathy with a race who had exalted beauty into a religion; who selected the finest forms to be found in the human form, and combined them into perfect, god-like creations freed from the small debasements brought about by disease or accident Leighton has been called, in fact, "the painter of the gods," just as his friend Millais was honoured as "the painter of men and women."

Sir William Richmond compares Leighton to a poet. "He made sonnets in pencil or paint. During the various stages of development, precision of thought, precision of design, precision of line—in short, good workmanship throughout—were vividly and efficiently sustained." This poetry in the artist is of the fine-chiselled order, like a Greek frieze in marble; its form fine, its workmanship precise, and its spirit controlled by a sensitive mind. One who knew him wrote, "Lord Leighton's art reflects himself—noble, generous, and beautiful."

Born in 1830, and sent abroad when young as a companion for his invalid mother, he took his first drawing lessons in Rome. It is to be imagined what effect that ancient city, with its rich treasures gathered through the ages, had on such a temperament. No wonder his first designs were less restrained in treatment than one would imagine from his later work. But from Rome he went to Frankfort, where he came under severe German influence; from Frankfort to Brussels, and to Paris.

This cosmopolitan study made him acquainted with the finest art; it left him deeply convinced that art should not deal with the hideous and transitory, but rather with "typical" nature—the forms struck out, as it were, by a master designer, but become hacked, twisted, and spoilt by contact with a grinding world. How different an outlook from the painters of martyrdoms! Yet each fills its place, and both are necessary.

An artist who keeps beauty mainly as his ideal, searching for it in art and natural forms alike, must develop a style instinct with grace; but there is always danger of this becoming the merely "pretty." Grace, distinction in line, classical reserve are exquisite; the burning soul of a creative artist also counts for something—much more, indeed, than scholastic finish. Leighton was hardly a Watts, or a Millet, or a Bastien-Lepage in feeling: he was a lyrical poet, finished, polished, exquisite in workmanship; they were less restrained, but struck a deeper note.

"He thought violent passions unsuitable subjects

for art; not so much because the sight of them is degrading, as because what is at once hideous and transitory in its nature should not be perpetrated."

Wherefore his art is distinguished for its grace in form and pose; his men and women are strong and tall; his drapery hangs in full folds, as he had learnt from the great Greeks and later Italians; the colour was warm and generous, a southern glow reflected from his study in Rome. The results are intellectual rather than expressive; delightful in form, line, and colour, and generous: to borrow William Rossetti's term, "the art of luxurious exquisiteness." Think for a moment of the stately yet graceful figures that come to mind with the titles, "Helen of Troy," "Bath of Psyche," "Day Dreams," "Andromache;" mainly women, but women of a greater age than this.

Whether or no such eclectic art will endure, or whether it will suffer eclipse like the French eclectic school represented by the painter David and his school, to us, in our generation, it is delightful for its cooling, refreshing beauty.

"Whittington, as Lord Mayor, Feeding the Poor."

(By Mrs. Ernest Normand.)

This artist was strongly influenced in her early career by Lord Leighton, who frequently gave her the benefit of his advice. Some of her paintings at that time, such as "Apollo and Daphne," contain elements evidently unconsciously borrowed from Leighton, with, however, touches that recall Marcus Stone. As said above, Lord Leighton painted part of the Parthenon frieze as the background to his own portrait; and Mrs. Normand spent much of her student life in drawing from the same sculpture as well as from the more massive figures that together make up the Elgin Marbles in the British Museum.

Evidently the artist's tastes were classical, but she supplemented this drawing from Greek sculpture by a long course of drawing from the life, not neglecting the study of English painters. I think it is not difficult to see in "Whittington" the influence of Fred Walker, Millais, and Pinwell.

Mrs. Normand began with classical stories, the ever-fresh stories of "Cephalus and Procris" and "Apollo and Daphne;" her ideal seemed to be Leighton's, "to show the essential poetry of fine form and colour thrown as a lovely garment over abstract ideas or fabled events." It was the everlasting quest for beauty, the search for the "open secret," the delicate grace which is instinct in natural things, but which, like the fairies in "Pinkie," are unseen and unsuspected by slow-witted mortals who walk about their busiest haunts.

Mrs. Normand is a thoroughly-trained artist, strong in drawing, skilful in composition, and a good colourist; But as a wall-decoration "Whittington, as Lord Mayor, Feeding the Poor" is hardly in keeping with ancient tradition. It is unbalanced, the groups on either side lacking in that general equality in *mass*, so much a feature in the Italian fresco, and followed by Lord Leighton; the principal figures in the centre are overshadowed in importance by those in the foreground, the relative importance being still further lost as one recedes from the picture; and lastly, the principal curves are not sufficiently marked nor sufficiently continuous with each other. It would make an admirable "easel" picture; but the qualities that are so excellent in such pictures (including the softening atmospheric effects drawn across the figures in the background) are so many weaknesses when applied to wall-painting. For this very atmosphere renders those figures in the background so shadowy that they do not carry on the principal lines from group to group.

Many fine old frescoes are not arranged in flat planes like those in Lord Leighton's painting, but in those cases there are strong lines, such as beams in the ceiling, or round arches, so skilfully introduced that the eye is inevitably drawn to the principal figures. The well-known Leonardo da Vinci's "Last Supper" is flat in arrangement, balanced in mass, connected in line; while in Tintoretto's picture of the "Marriage Feast at Cana," the principal figure of our Lord, though placed far in the background, instantly arrests the eye, because the architectural lines lead to that point, and a bright halo still further focuses the attention.

Mrs. Normand could have done the like by placing Whittington where the lines above the doorway should point to him, or by framing him between the upright doorposts. Even the signboard (with its sign of the *Kat* or trading vessel by which Whittington obtained his wealth) would have been effectively used by old designers to rivet the attention to Whittington; it should have been placed immediately above his head. As it is, the picture has too much the appearance of disjointed "studio" groups, academy models ingeniously posed, to give an appearance of reality; it is, in short, too pretty and too obviously sentimental to be pleasing, while it fails in being out of harmony with the general decorative scheme outlined by Lord Leighton. For a decoration must necessarily be either severe, as Lord Leighton's, or involved as a rich mosaic, like Mr. Frank Brangwyn's frescoes for the Skinners' Hall.

CARDBOARD MODELLING.

BY FELIX T. KINGSTON, BARRY.

Model No. 11.—A Tetrahedron.

TO be bound and covered. Fig. 16 shows the setting out. In fixing, begin with the two edges marked X. This exercise and the next afford good practice in mitreing binding strips at various angles. Follow the same method in all cases—namely, cut each piece to the required length, fold it, place in position, mark with pencil the positions of the mitres, remove from the model, and cut away the waste ends before finally fixing.

Model No. 12.—A Square Pyramid.

To be bound. Draw the square $2\frac{5}{8}''$ side (Fig. 17). With centres A, B, radius $3\frac{7}{8}''$, draw arcs intersecting at O. With centre O, draw the curve through AB. With radius $2\frac{5}{8}''$, mark off BC, AD, DE.

To obtain a finely-pointed apex, score rather deeply at O. When binding, take opposite edges first.

If the lines AB, AO be made in the proportion of 19 : 18 (say, AB = $2\frac{3}{8}''$ and AO = $2\frac{1}{4}''$), the model will be an approximate representation to scale of the Great

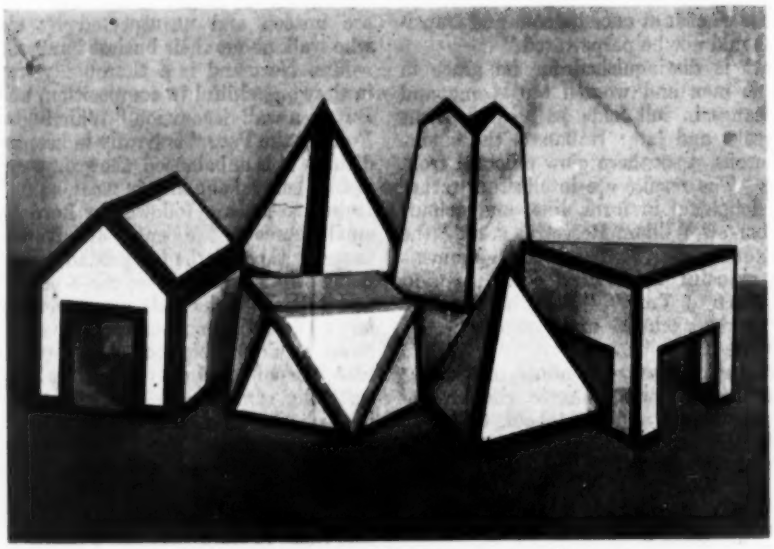


FIG. 22.—PHOTOGRAPHIC REPRODUCTION OF MODELS.

Pyramid of Egypt. In this case it may be possible to connect it with a geography lesson.

MODEL NO. 13.—A TAPER HOLDER.

To be bound and covered. See Fig. 18. In fixing, treat the sloping edges first, as in No. 7. An added difficulty presents itself in the cutting of the covering papers to size. Allow about half the width of the binding to show all round. Metric measurements are given here as a change; if impossible to adopt them, use approximate English equivalents.

MODEL NO. 14.—A DOG KENNEL.

To be bound. For the development see Fig. 19. Flaps may be added if preferred. Note that the lines *a'b'*, *ab* are equal.

When fixing, begin with the upright edges A*b*, etc., as in the previous model. Bind the rest in any convenient order.

The handling of this model will foster deft use of the fingers and control of muscular movements, while the length of time required will make a heavier demand than heretofore on the pupil's patience.

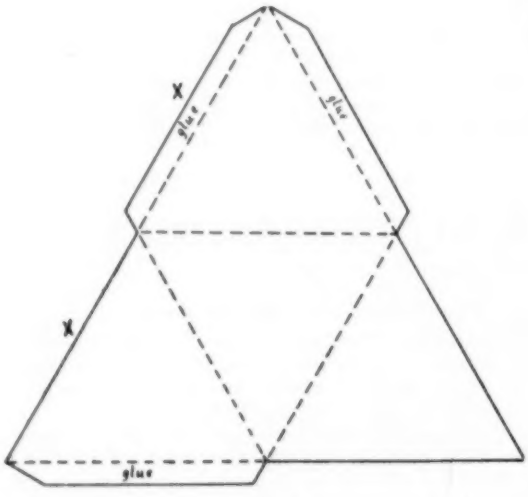


FIG. 16.

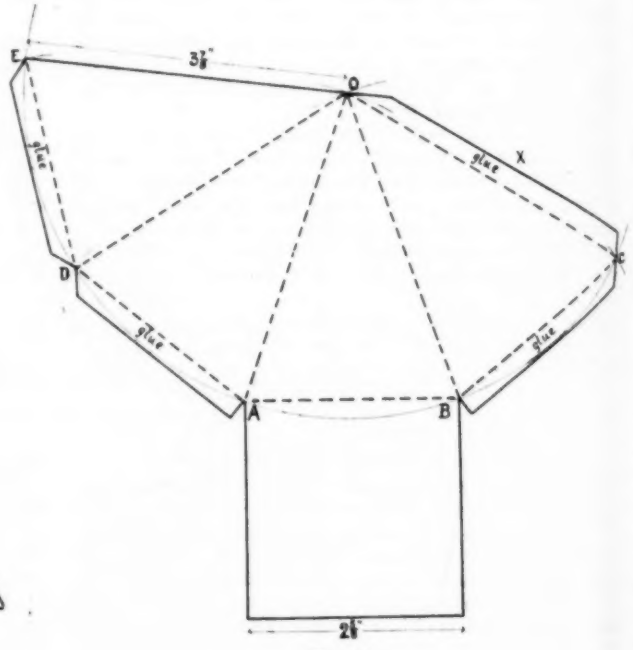


FIG. 17.

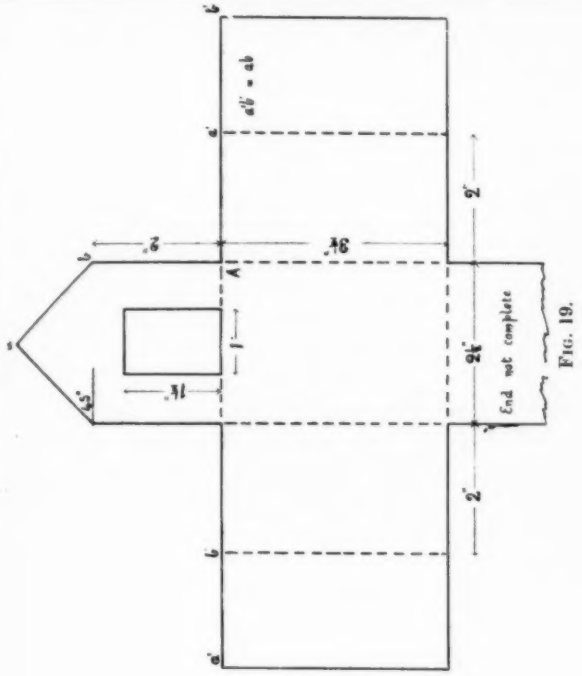


Fig. 19.

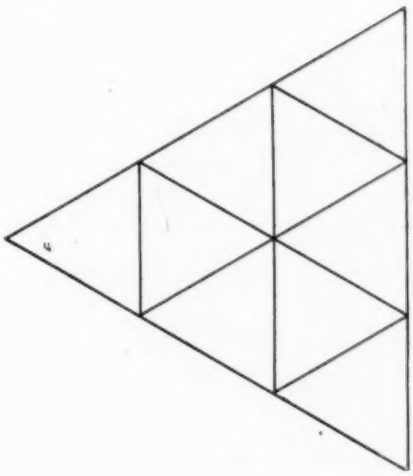


Fig. 20.

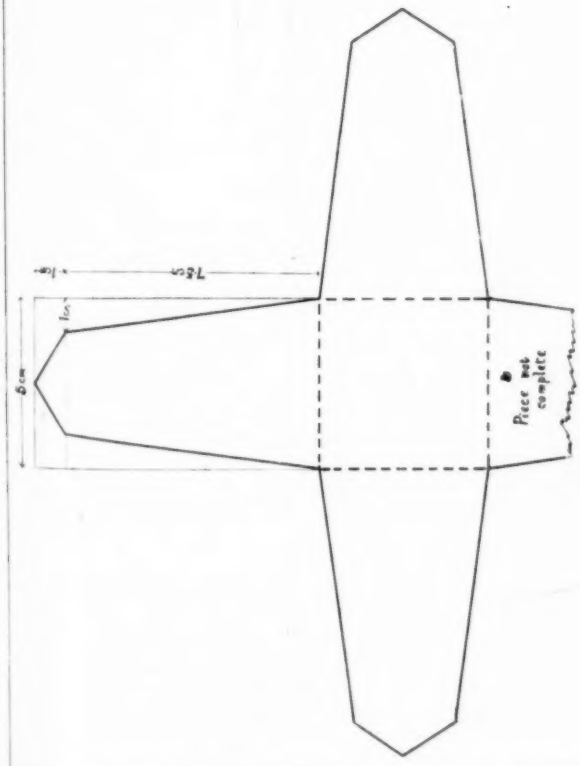


Fig. 18.

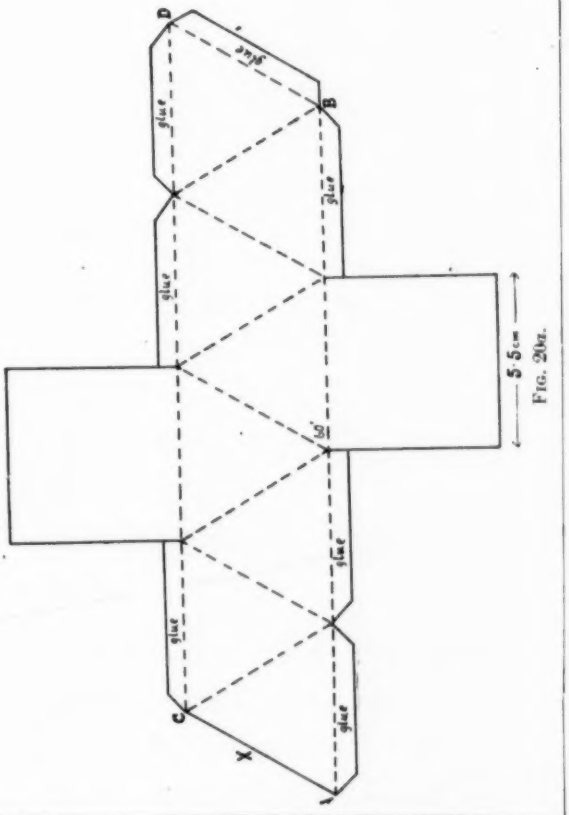


Fig. 20a.

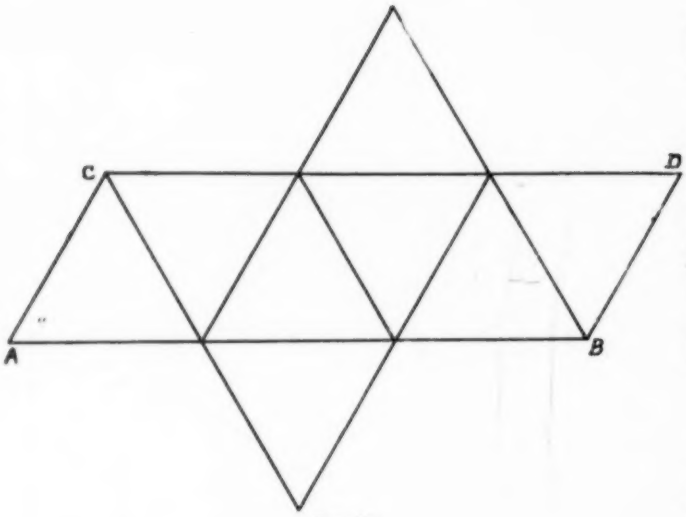


Fig. 20c.

Model No. 15.—A Geometrical Solid.

To be bound and covered. See Fig. 20*a*. Construct the four equilateral triangles, each 5·5 cm. side, along AB. Next draw CD through the apexes to obtain the remaining four. The squares, 5·5 cm. side, on the top and bottom complete the figure. When gluing begin at X. The pieces of paper for covering the triangular faces may all be cut at once as in Fig. 20*b*.

Note that if the lines AB, CD are shortened so as to enclose six triangles (Fig. 20c) instead of eight, and equilateral triangles be substituted for the squares at top and bottom, we obtain a solid with eight equal triangular faces—the octahedron, which may be adopted as an alternative to the present exercise. Other solids may be developed on the same principle by lengthening the lines AB, CD to include ten, twelve sides, and replacing the square by the pentagon or hexagon, and so on.

Model No. 16.—A Stool.

To be bound and covered. See Fig. 21*a*. The only point which presents new difficulty is the cutting of covering paper to fit the sides of the stool. The dimensions of each piece are given in Fig. 21*b*.

Use the compass freely in setting out the developments of this and all other models, thus following up the work of the previous stage. The drawings give abundant scope for including in their construction many of the usual problems in plane geometry—for example, bisection of lines, erection of perpendiculars, drawing of lines parallel to given lines, etc.

In concluding the present stage, it may suffice to suggest that the work will be less stereotyped and vastly more educational if the exercises here given are made to serve the purpose of enabling the teacher to frame a scheme of his own.

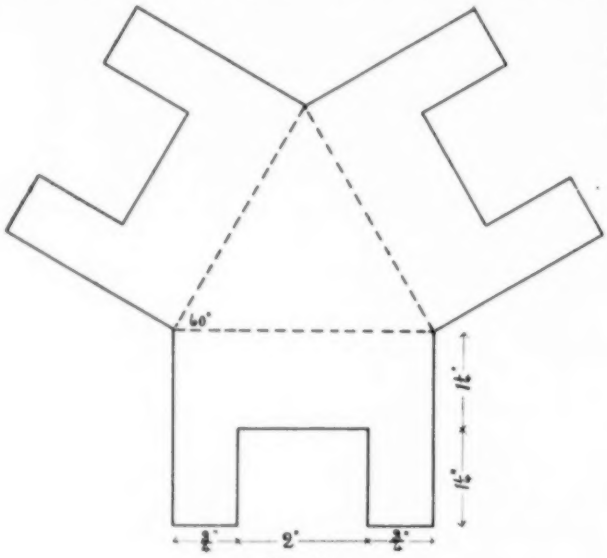


Fig. 21*a*.

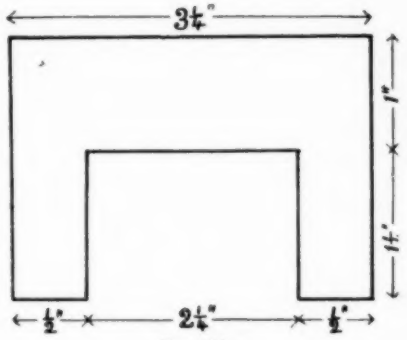


Fig. 21*b*.

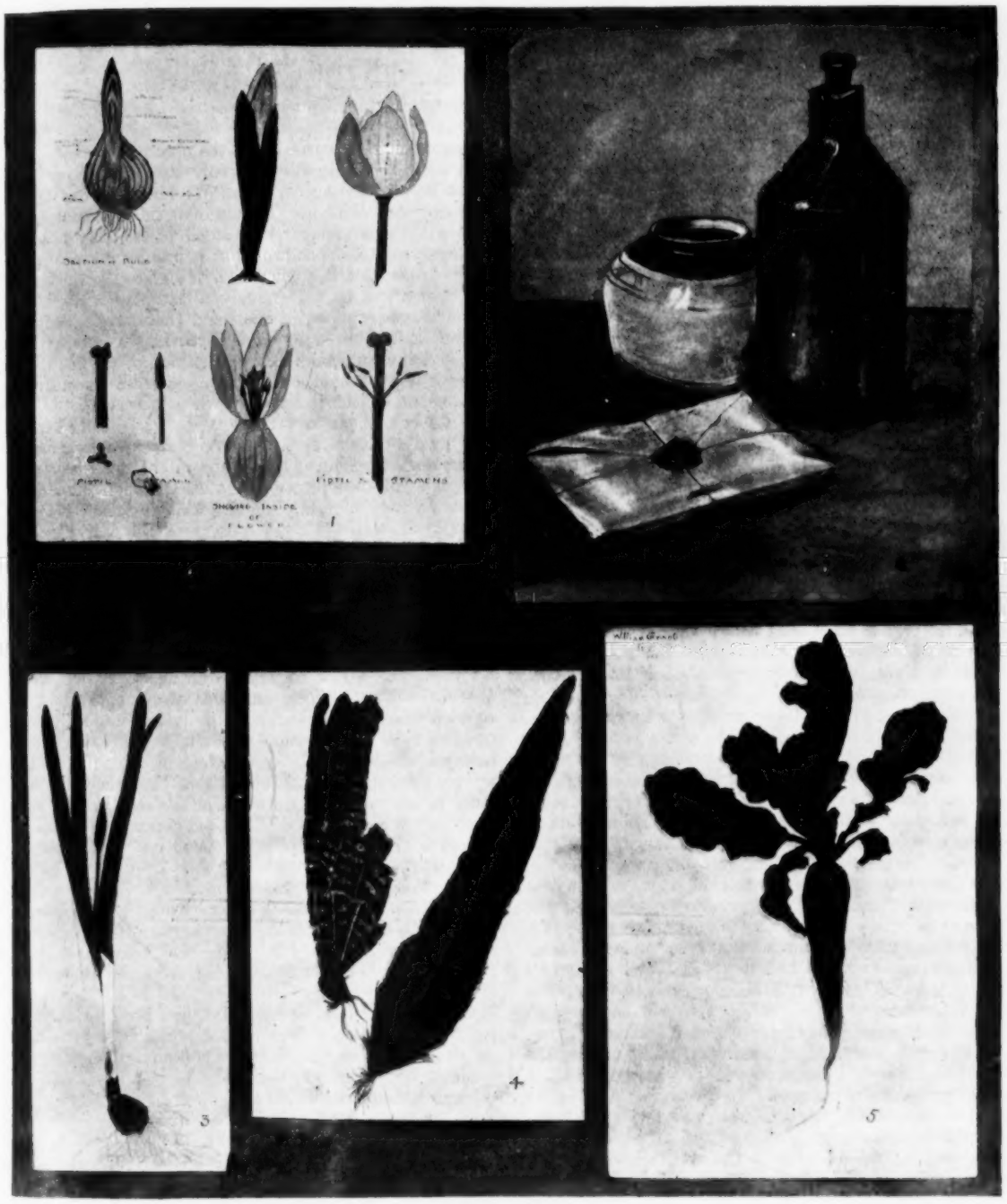
HONOURS PAGE.

Prizes have been gained by—

1. William Codlin (13), Grange Boys' School, Jarrow-on-Tyne.
2. Robert Sharp (14), Tulliallan P. School, Kincardine-on-Forth.
3. John Nisbet (12), Tillmouth Council School, Northumberland.
4. Elsie Parker (12), Primrose Hill School, Leeds.
5. William Grant (14), Sudley Road C. School, Aigburth, Liverpool.

No. 1 was a careful study, in water colour, of the details of a tulip; No. 2 an interesting and well executed pastel drawing. Nos. 3, 4, and 5 were all capital renderings of natural forms.

The first list of pupils selected for commendation are :—



HONOURS PAGE.

Oscar Johnson (12), Hurley Council School, near Atherstone; Lily Hawtree (12), Capland Street Council School, St. John's Wood, N.W.; Joseph Linnett (13), Mantle Road Council School, Leicester; William O'Neill (14), St. Mary's College, Linthorpe; A. Wright (13), Cathedral School, Great Charles Street, Birmingham; Allan L. Gornal (13), Sulyard Street School, Lancaster; David Poole (12), Newton Academy, Ayr.

MANUAL WORK AS A MEANS OF SELF-EXPRESSION.

A LECTURE BY DR. J. W. SLAUGHTER, PH.D.

AT a meeting of the London branch of the Educational Handwork Association, held at the Royal Society of Arts, Dr. Slaughter gave a very interesting lecture on "Manual Work as a Means of Self-Expression." The chair was taken by the president, Dr. Kimmins, who, in welcoming the lecturer, said that it was not necessary to introduce him to the present audience. They were always ready to listen to Dr. Slaughter, who was formerly the right-hand man of Dr. Stanley Hall, the greatest living authority on the development of the child.

The lecturer, in introducing his subject, remarked that the topic he proposed to speak on would have been an easier one if they only had an authoritative definition of what "self" was. Modern psychologists had not yet agreed on the point, but they had decided that it was not a mysterious entity tucked away snugly in the back part of the brain. They could perhaps best symbolise it by representing it as a circle of indefinite area rather than as a fixed point. In a young child there was no self in the sense in which they were accustomed to regard the adult self. There was certainly the beginning of self, but it must grow. The question before them was, "How can manual work be utilised in the making of the personality?" For in children we did not think of self-expression as we thought of it in an artist or a sculptor. It was not the same thing at all; a child did not consciously express itself to anybody. It had spontaneous expression.

A primary question of the greatest importance was, "What do we mean by education, and what is it good for?" In his opinion the *present system of education was a decided failure.* It was the aftermath of the industrial revolution of fifty years ago. Working people were being turned into machines—the concentration of workmen in factories made them mechanical, mere cogwheels in the industrial machinery. They wanted something better for their children than this, and it was considered that if the rising generation only had the elements of knowledge, just the necessary three R's, then every means of culture would be open to them. But these expectations had not been fulfilled to any great extent. The children were very little better off than their fathers were; they were still cogs in the industrial machine. But why take eight years in which to master the elements of writing, reading, and arithmetic; these could be mastered in six months if a proper system were adopted. It was owing to obsolete ideas on education that children still left school uncultured.

He would remind them of the well-known physiological system of reflex action. The reflex arc had two poles—one of *stimulation*, and the other of *response*. There was no living action without *impression* and *expression*. In our system of education we had drawn a hard and fast line between the intellect and the body, while as a matter of fact no such line of separation existed. We regarded the intellect as purely receptive, while the training of the body took place outside of the schoolroom altogether, as in organised games, or the use of dumb-bells and Indian clubs. There was a distinct break between the two. Now the act of learning necessarily involved *both poles*, that of *impression* and *expression*. It might perhaps be described by the formula:—

Impression + expression = the organ of perception.

There was never any merely passive act of learning; there must be also the active side. We must get our knowledge by expressing it. The act of an infant who delights in tearing a newspaper into small pieces may possibly be annoying to a spectator, but it was by no means the useless operation it seemed at first sight. To the infant the paper was at first merely a patch of white; but when it was grasped in the hand there was a sense of feeling something—there was a rustle, when torn there was a delightful noise. The education of the hand and the ear had commenced. Every object in the universe became an object really only when it was used. This was, of course, no new theory. It was affirmed years ago by Pestalozzi, and was now reaffirmed by modern psychologists. Thus it was absolutely necessary in a true system of education that occupation should be provided for the child. There was a difference between occupation and work. We do *work* for a living; an occupation is something done because one *liked to do it.* By considering what a person did, we could tell what his outlook on life would be.

A banker had one outlook, a clergyman had quite a different one. The vagabond had still another point of view; his occupation was one of the most elaborate and complex—that of endeavouring to avoid work. One *is* what one *does*, and this statement might be applied to nations as well as to individuals.

The object of education might be roughly considered as a preparation for the occupations of adult life. Thus at one pole we have the infant; at the other, the life-work he has to do. Education means to make progress from one pole to another. The old conception of education was the training of a few faculties, which modern psychology said did not exist at all.

The wisest teacher was he who knew *how to let the children alone.* To take a simple example—a gardener did not do the growing for his plants. He provided a suitable environment for them—heat, moisture, space to grow. He hardened them and protected them from their enemies.

Our great mistake in education had been in attempting to *do the growing for the child*, while all we ought to do was to provide the right kind of environment. The business of the school was really to provide a number of environments, following each other in regularly graduated sequence, and culminating at last in complete citizenship.

We should convert our schools into real nurseries, provide opportunities for growth, and then *let the child grow on its own account.* It would then follow its own line of development. The provision of opportunities was the proper function of the teacher; the natural function of the child was its play interests. We must extend the toy idea, and approximate toys to the different ages of the children. In a properly graduated scheme this would culminate at the age of fourteen in the well-equipped physical laboratory; its test-tubes and retorts were the toys at that period of school life.

Thus the solution of the problem of modern education was to be the self-appointed task of educational hand-

work. But there were great dangers to be met with in this proposed programme. One of the principal dangers lay in the question of *skill*. It was quite possible to introduce a kind of handwork into the lower standards which would do more harm than good. Speaking generally, the acquisition of skill seemed to be the present object of handwork, but this idea was not educational.

In judging handwork, he did not care whether the work as shown in the exercise or in the drawing book was good or bad. What true standard could we take? What was *excellent* for Tommy Smith was *bad* for Johnny Brown. He did not greatly care for technical excellence; it did not necessarily imply very much. It was a fact that people who never made mistakes were of the least value in the world. Being able to spell, write, and punctuate properly did not imply ability; it did not imply the ability to create in any original sense. No, something different was required from mere skill. If we aimed at skill alone we became mechanical, for skill was a habit. He was not demanding that there should be *no skill*, but it must be acquired incidentally—it must be attached to something else. If a dog were placed in a box and food were placed outside, the dog by a series of experiments would eventually find out the device which opened the box. This was a clear case of the acquisition of skill, but the business of the dog was not to acquire skill; his main business was to get the food. The formation of the habit, or skill, came of itself. Fancy a big mastiff coming along and trying to instruct the little dog how to get out of the box. How ludicrous the idea was! The business of the would-be marksman was to watch the target. We spent our time in teaching the children how to pull the trigger.

The idea of the training of a faculty had given way to the idea of growth when a suitable environment was provided. We talked about intellect. Did we possess such a thing? If so, it was a very small affair, certainly not worth considering in a child. We should not treat children differently from how we treat ourselves. We did not *prepare* for skill; we did a certain thing over and over again, and thus *acquired* skill.

One inevitable consequence of this new idea in education was the abolition of the exercise. He had no hesitation in saying that the *model* was an invention of the devil, and its Satanic influence on our system of education would take a very long time to overcome. For what was a model but an exercise in developing a faculty; but there was no such thing as a faculty, and therefore the model was altogether useless.

What, then, were we to do with the boys and girls of thirteen or fourteen? Let them use their *own constructive ability, not the ability to imitate others.* Show them some end in view, something altogether desirable, something to work for, just as we showed the dog its food, and they will find some way out of the box. Not that we need altogether banish processes, but let the teaching of such be incidental. The making of the joint in woodwork, for instance. How many, many hours were spent in copying this exercise in all of its many forms. In Dr. Stanley Hall's writings four grades of knowledge were tabulated. There was (1) the knowledge derived from hearing, from being told something by somebody—as, for instance, how such and such a thing was made. The hearer might remember something about it; he would more probably forget all about it the next day. (2) There was the knowledge derived from having seen something done—as when we showed a friend an experiment in the laboratory. Having seen, he may remember something about it. (3) The knowledge derived from trying to do something himself under the direction of some other person—as when lads experiment under the supervision of the teacher. (4) Knowledge acquired by his having some end in view, and then setting about it himself in his own way. This last kind of knowledge was the best, not to hear and repeat, not having an object lesson, not merely copying a model, but getting experience in the best and fullest sense of the word.

The child should live as naturally at school as at home. Finally, they should remember that education was not a *training*, but *the assisting of the child to grow* and to live at its best.

In inviting discussion, Dr. Kimmins remarked that the lecturer had been very heterodox, even for Dr. Slaughter. He was sure that some stray corns must have been trodden on.

It was soon very evident that this was the case, for one speaker after another objected to the theories advanced as being altogether impracticable and unworkable. One speaker, a headmaster of twenty-five years' standing, referred to the lecturer as a great idealist, and foresaw the time when schools might be abolished altogether. If this system came into operation, what would be the size of the classes? Another objected strenuously to the second place occupied by the acquisition of skill in the system outlined by Dr. Slaughter. He thought skill a great thing, and absolutely necessary. A third asserted that a child could not be allowed to develop in his own way. It was a teacher's duty to curb some of the tendencies which may be very dangerous. Another teacher remarked that although it was evident that teachers generally did not altogether agree with the lecturer's theories, they might still learn something from the ideas dropped that afternoon. Dr. Slaughter, in reply, said that he did not want every one to agree with him. A real educational system must be developed by experiment, and could not be decided by controversy alone. As to the size of classes, he admitted that they were at present far too large. Twelve to twenty children was the ideal number. The talk about abolishing schools was nonsense; more teachers and better would be required. They must invest more to get great returns. Referring to the remarks on skill, he would have skill by all means—the more the better, but it must be obtained in the right way. Some one had kindly referred to his skill as a lecturer; but he would say that such skill as he possessed was not obtained by taking elocution lessons, but by having made a fool of himself in public speaking for fifteen years. He should be sorry to trust himself to the skill of a pilot who had learned *the theory only* of navigation, and had not had the necessary practical experience.

Votes of thanks to the lecturer and chairman then terminated a very interesting and instructive meeting.

MUSEUMS AS FACTORS IN EDUCATION.

BY PERCIVAL J. ATKINS, ART MASTER, LEICESTER.

STIMULATION is the grand asset in teaching, and having once secured this healthy feeling in the minds of children, illimitable results will accrue. The continual question of an ambitious teacher is always, "How can I best sustain the interests of my scholars so as to imbue them with a thorough love of their subject?"

Most towns fortunately possess museums which contain good collections of birds, beasts, and fishes, besides numerous other objects useful for study, such as Roman remains, specimens of geology, zoology, etc.

These, besides being fine studies in themselves, may, as drawings, be "correlated" with the elementary science taught in most schools at the present day. As far as possible "correlation" should form a noticeable feature in the school curriculum. For instance, the study of seventeenth-century armour might form the subject for a splendid history of the Civil War. I will here give its history, which will speak for itself:—

"This piece of armour, consisting of breast and back plate, with headpiece, belonged to and bears the name of Gerard Fowke of Bachacre, Staffordshire. He was the son of John Fowke, Esq. of Brewood, also in Staffordshire, from whom Sir Frederick Fowke, Bart., of Loseby Hall, Leicestershire, is directly descended. On the breaking out of the Civil War, Captain Gerard Fowke raised a troop for the king at his own expense, in consequence of which his estate was sequestrated by the Parliament. According to the family records, he took part in the battle of Hopton Heath, outside Stafford, in March 1642, at which the Earl of Northampton lost his life, and was afterwards appointed Deputy Governor of the

town. Subsequently, although he had lost an arm, he served in Bohemia and other parts."

Then, again, the study of "Roman architectural remains" found near Leicester gives scope for local information. In the illustration will be seen a stone gutter lying across a plinth, also the drum of a column lying across a plinth, with part of shaft of a column.

As in outdoor sketching, the same general principles are involved, careful detail studies, with pencil point, of the different parts preceding the drawing of the whole.

This, besides familiarising the student with the general characteristics of the object, also cultivates a knowledge of the relative tones, which is so essential. The different skeletons of the museum should undergo a thorough examination, as without some knowledge of anatomy the drawings will lack the necessary vigour. The general setting out on the paper, with due regard to proportion and arrangement, should be a preliminary step. Some definite plan of campaign should always be thought out before commencing operations each day.

It is not wise to allow the scholars to be too scattered over a large area, as supervision becomes more difficult and valuable time is wasted. Within certain limits, boys should be left to their own resources, the teacher offering advice when needed, but allowing the boys full scope for their own imagination.

This method cultivates the spirit of "self-reliance," and develops "originality;" in fact, creates an "individuality."

In the past teachers have erred too much on the side of instruction, and have gone to endless, needless trouble. If the child's judgment is rightly guided with discrimination, the result will be the opposite of a mechanical process. The blackboard should be used chiefly for rectifying mistakes.

General information on natural history should be given before the actual drawing; in this way information and lively interest become cause and effect.

Points of similarity and contrast should be noticed. A study of the different kinds of beaks and claws of birds, with their respective functions, should form a most instructive lesson, for it may be pointed out that these are Nature's provisions, exquisitely adapted for their various purposes. The powers of association will thus be trained. For instance, the sharp claws of the eagle accompany the cruel curved beak, while the harmless webbed foot of the duck is connected with the docile beak, etc.

Pencil studies should be followed by coloured crayon renderings. This as an intermediate stage prepares the student for water-colour work as a final stage. More special attention must now be given to the actual drawing. It is always wise to make the drawing a little larger, as the colour somewhat condenses the outline. It is insufficient simply to paint pretty colour; but due regard must be paid to the relative tones. The light in the eye, the top and half lights require close observation.

Curators as a rule are only too pleased nowadays to offer every facility to students, and permission to utilise museums for such excellent educational purposes may easily be obtained for the asking. We have such an enthusiastic museum committee in Leicester, the members of which are so anxious in the cause of education that they have framed and exhibited in the museum a large number of studies executed by our boys, their main object being to show what has been done, so that other schools may follow a similar incentive.

DRAWING AND CHEMISTRY.

BY AGNES E. FARMAN, LEICESTER.

A KNOWLEDGE of drawing is essential to the science student, whatever his particular branch of work may be. Diagrams with brief notes are generally considerably shorter and clearer than mere verbal descriptions. Now that science lessons are a part of every school curriculum, all children should learn how to state facts by simple diagrammatic drawings; but this ought not to be the work of the science teacher, whose time is often all too limited for the work he has to do. Further, the science lesson is not the proper place for the *teaching* of drawing of any kind, although it offers a valuable opportunity for its application to a particular and definite purpose.

In the chemistry classes, for example, the diagrams showing the arrangement of apparatus for experiments often prove very puzzling to children. The kind of shorthand description of which such diagrams consist is at first very difficult for them to grasp, especially if all their previous instruction in drawing has been from objects in the ordinary positions. The diagrams required for the chemistry are practically the elevations of things, therefore some solid geometry should be introduced in the drawing lessons as soon as the children begin this work.

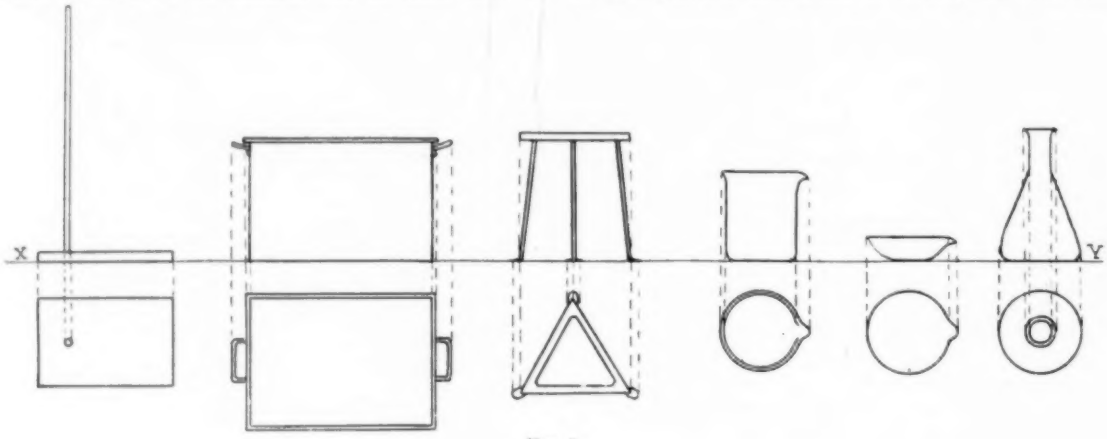


FIG. 1.

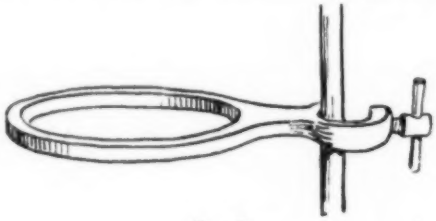
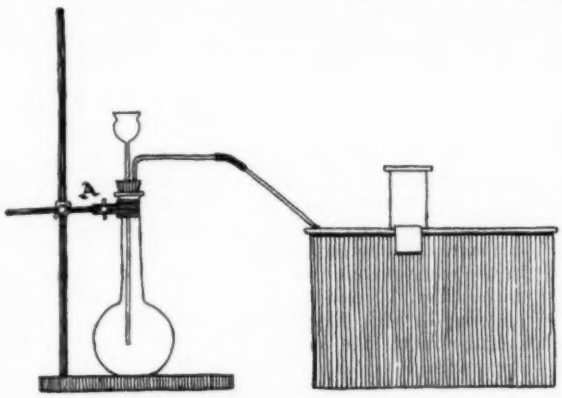


FIG. 2.

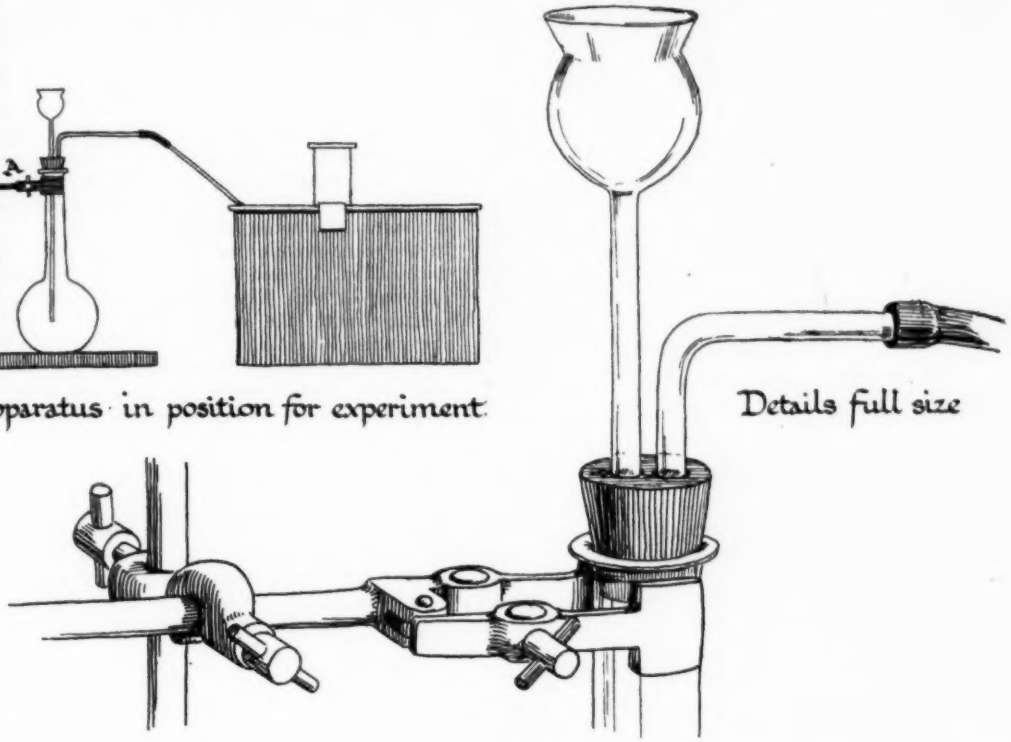
FIG. 3.

Certain preliminary problems will be needed before any apparatus can be drawn, but many of the appliances are so simple in form that they can be used singly quite early in the course. A lesson on the plan and elevation of the cube leads easily to others—on the rectangular pneumatic trough, the stand and rod to which the clamps are fixed, or the little platform placed over the scales for weighing things in water. Exercises on circles

FIG. 4.



Apparatus in position for experiment



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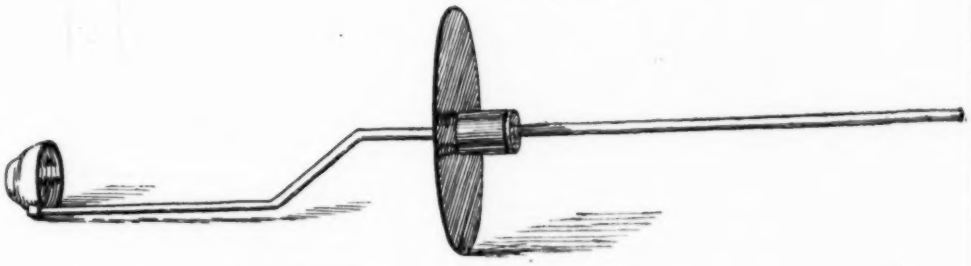
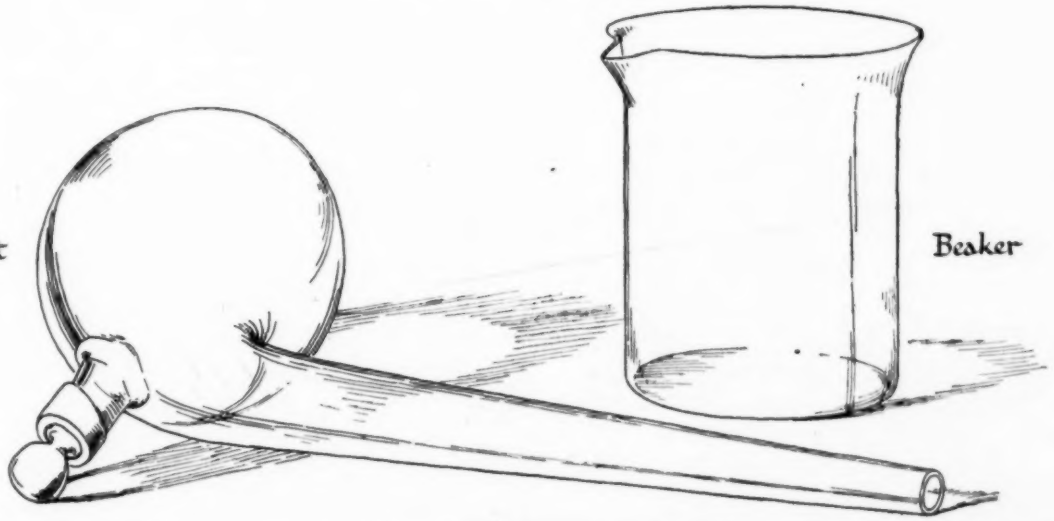


Deflagrating Spoon



Retort

Beaker

can be followed by others on the beaker, evaporating basins, and flasks of various forms (Fig. 1).

Without some training in solid geometry, it is very difficult for children to realise that though the support for a flask or retort appears as in Fig. 2, in an ordinary way all that is required for the science diagram is its

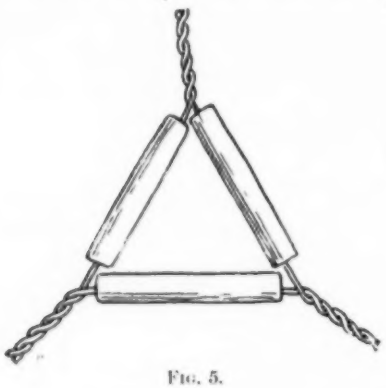


Fig. 5.

geometric elevation (Fig. 3), or as at Fig. 8 (A) in the arrangement of apparatus for distillation. A tripod which one thinks of as at Fig. 4 and the pipe-clay triangle (Fig. 5) that is placed on it to hold an evaporating basin, are represented as at Fig. 6 and at D in Fig. 8; while the clamp and collar which are drawn in detail on page 146 need only be shown as at B and C in Fig. 8 or as at A on page 147.

From the point of view of the drawing teacher, examples of the kind mentioned above will serve quite well as satisfactory exercises for the purpose of elaborating the lessons in solid geometry, and from that of the science teacher they will prove most helpful in making clear elaborate arrangements of apparatus, and will prevent the confusion between an elevation and a foreshortened view, which is so often found in children's diagrams.

Further, in lessons on model drawing, the apparatus will be found to provide a welcome change from the monotony of saucepans, jugs, teapots, and boxes. Any intricate drawing, such as the arrangement of clamps on page 147, should be taken full size and blocked out in the same manner as any common object with much detail (Fig. 7), and the careful study necessary for a drawing of this kind should make the pupils quite familiar with the construction and arrangement of apparatus.

A word of caution to the drawing teacher is perhaps necessary. Much of the apparatus in a chemical laboratory needs very careful handling, and certain things—for instance, balances—cannot well be moved from their place, but with reasonable care a great deal can be utilised in the model lessons, such as flasks, bottles and their stoppers, tripods, crucible tongs, circular and rectangular troughs, beehive shelves, pestle and mortar, and bunsen burners. The correlation of lessons is a matter which is now rightly receiving a great deal of attention, and it will add much to the value and importance of drawing in the school curriculum if the drawing teachers learn to realise how they can help forward the work in other subjects; while children who are interested in science, but do not care for drawing for its own sake, will work with more enthusiasm when they see how it can be applied to their favourite subject.

Fig. 6.

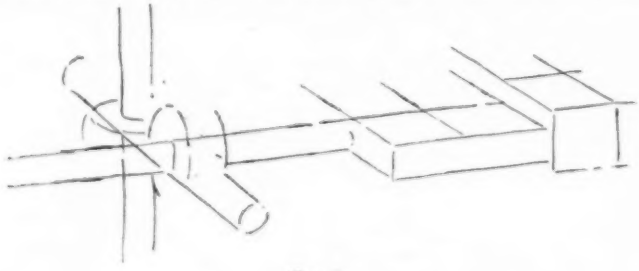


Fig. 7.

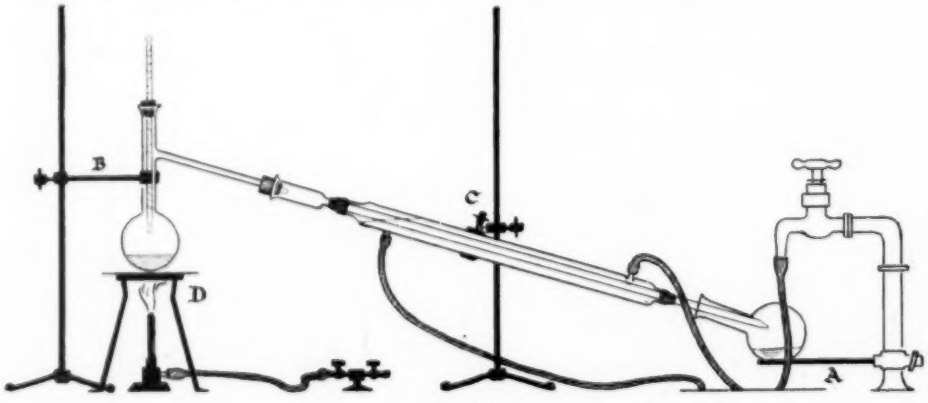


Fig. 8.

NOTES AND SUGGESTIONS ON THE TEACHING OF EXPERIMENTAL SCIENCE, MATHEMATICS, AND DRAWING.

BY C. HAMILTON.

(*Continued from page 92.*)

Section XIII.

SHOW how the use of natural sines, cosines, and tangents involves multiplication and division of large numbers. Perhaps the best plan is to pull the class up by a problem which will involve a considerable labour. This purpose will be served, and the students will acquire a useful weapon, if the sine formula for the solution of a triangle is introduced. It is not desirable to go into trigonometry very deeply at this stage, but a simple formula will be useful, and its establishment is not difficult.

Draw a triangle ABC, with AB as base, and C, the apex, an obtuse angle. Letter the sides opposite the corresponding angles a, b, c. Drop a perpendicular from the apex to the base at N, and call it p. Then question the class as follows :—

CNA is a right-angled triangle. What is the sin A ? $\left(\text{Answer, } \sin A = \frac{b}{p}\right)$.

What will p be equal to ? $\left(\text{Answer, } p = \frac{b}{\sin A}\right)$.

Again, CNB is a right-angled triangle. What is sin B ? $\left(\text{Answer, } \sin B = \frac{a}{p}\right)$.

What will p be equal to ? $\left(\text{Answer, } p = \frac{a}{\sin B}\right)$.

Finally, since we have $p = \frac{b}{\sin A}$ and $p = \frac{a}{\sin B}$, what is $\frac{b}{\sin A}$ equal to ?

In Section X. it was suggested that the fact that both sides of an equation could be treated alike should be introduced in connection with the equality of two ratios, and the method of transferring a quantity from one side of an equation to the other may be dealt with here. Thus to get rid of sin A on the left, multiply both sides by sin A ; to get rid of sin B on the right, multiply both sides by sin B ; and so on.

It will be obvious that the solution of this equation involves a considerable amount of calculation, and the class will be ready to give an attentive ear to a labour-saving device burdened with the name logarithmic calculation.

Recall the decimal notation, and ascertain whether the class have a clear notion of a power of 10. Explain that while $10^2 = 100$ and $10^3 = 1{,}000$, any number between 100 and 1,000 may be supposed to be produced by raising 10 to a power somewhere between 2 and 3. Similarly, a number between 10 and 100 might be produced by raising 10 to a power between 1 and 2, a number between 1,000 and 10,000 ($= 10^4$) by raising 10 to a power somewhere between 3 and 4.

Show next that $2 \times 2^2 = 2^3$, $2 \times 2^3 = 2^4$, $2^2 \times 2^2 = 2^4$, $2^2 \times 2^1 = 2^3$. Ascertain whether the class understand that the indices are *added* in the product. Set a number of these examples, followed by $a^x \times a^y$, and similar cases.

Find next a meaning for fractional and negative indices. From the rule already learnt show that $a^1 \times a^1 = a$. Then ask what name they give to a quantity which, when multiplied by itself, gives a. If there is any difficulty, ask what number multiplied by itself gives 100 ; then in what relation does 10 stand to 100 ? Again, what quantity stands in the same relation to a as 10 does to 100.

It is quite likely that the answer given will be $\frac{1}{10}$. In that case repeat the process with 5 and 25, 6 and 36, 7 and 49, 8 and 64, 9 and 81. In other words, widen the presentation so that the $\frac{1}{10}$ is ruled out.

When the fact has been grasped that $a^{\frac{1}{2}} = \sqrt{a}$, ask what $a^2 \div a^2$ comes to, and obtain the result that $a^2 \div a^2 = a^{2-2} = a^0 = 1$. Hence the power to which 10 must be raised to produce a number between 1 and 10 must be between 0 and 1.

Ask next what $\frac{a^2}{a^4}$ would be. Then put it in the form $a^2 \div a^4 = a^{2-4} = a^{-2}$. Hence $a^{-2} = \frac{1}{a^2}$. Emphasise now the fact that if we have a series of indices expressing the powers to which 10 must be raised to produce all numbers, we can perform all operations of multiplication and division by adding or subtracting the indices. Such indices are called logarithms.

It should be noted that the exercises for the purpose of giving practice in logarithms need not be numerous, but a few exercises should be set weekly to give confidence and facility in their use. A few examples should be worked by the teacher, the students finding the logarithms, partly to give them practice in using the tables under supervision, and partly to show how to set out the work.

EXERCISES.

1. Find the logarithms of the following numbers—3·142, 6·836, 9·412, 27·32, 41·89, 97·65, 324·6, 428·2, 856·43, 2,794, 3,791, 8,642, 6, ·7854, ·3142, 80,000, ·0041, ·000367.

2. Find the numbers of which the following are the logarithms —·80618, 1·27875, 2·59106, 4·30103, 2·47712, 1·90309, 3·84510.

3. Find the area of a square field, whose sides are 479 yards long. How many acres is it ?

4. Find the area of a rectangular field 743 yards long and 357 yards wide. How many acres ?

5. A square field has an area of 37 acres. Find the length of a side in yards.

6. One angle of a triangular field is 30°, and another is 25°. The side between them is 140 yards. Find the third angle, the length of the other two sides, and the area.

7. A church A is 789 yards from a milestone B. C is another church. The angle CAB is 95° 30′, and the angle CBA is 67° 30′. Find the distance between the churches.

8. Observations of a tree on the opposite side of a river are taken from two points, A and B, 300 yards apart along the bank. For that distance the river is practically straight. The angle at A is 62°, and that at B is 51°. What is the breadth of the river ?

Section XIV.

Up to the present the class have only dealt with lines and plane figures. Their attention may be directed to calculations of volume, and in this, as in all other sections, the teacher should set a problem to find whether the students do or do not know the rule. If they cannot solve the problem, they have an incentive to learn the method. On the other hand, if they can solve it, much time may be saved.

The rectangular slab or prism is the first example to consider, and the rule for finding the volume may be inferred by the method usually found in books on elementary practical science, and in the more modern books on mensuration. The rule should be stated as an equation, V = L × B × T, in which the measurements to which the symbols refer are obvious.

The class should work a few examples in order to fix the rule. Explain that if L, B, and T are all the same, the solid is called a cube. If x is the length of one edge, the volume $= x \times x \times x = x^3$. Hence explain cube of a number and cube root. Show that $10^1 \times 10^1 \times 10^1 = 10^{1+1+1} = 10^1$. Hence $10^1 = \sqrt[3]{10}$. Let the class work some simple examples on the volume of rectangular solids and the weight, having given the weight of a cubic foot, inch, or centimetre of the material.

The class may now find by ordinary multiplication the cube of $(a + b)$ and $(a - b)$. Build up such a cube with smaller cubes cut out of wood or soap, and show the volumes which correspond to the terms in the algebraical expression. Cube $1 + x$ and $1 - x$ as a further exercise in algebraical multiplication, and for the purpose of again drawing the attention of the students to the form of a binomial cubed, but for the love of Heaven keep the last two words out of sight.

Refer to the formula $V = L \times B \times T$, and ask what $B \times T$ is (area). Hence get the class to express volume of a rectangular solid as $L \times A$. Ask now for rule for volume of (*a*) triangular prism, (*b*) cylinder. Calculate the relation between the surface and volume of a cylinder. Explain the advantage of large pipes for heating buildings by hot water; while the heating surface is proportional to the radius, the volume of hot water circulating is proportional to the square of the radius. The water therefore cools more slowly. Work some exercises involving the relation between capacity and volume, and show the advantage of the metric system in this connection.

It will be noted that no attempt has been made to deal with the surface and volume of the cone and sphere. The methods of arriving at these are neither simple, direct, nor wholly satisfactory, and, with the exception of surface of a cone, are of very little practical importance. The problems may well be left until the student has acquired sufficient mathematical understanding to follow the ordinary proof. It is rather a waste of time to learn in 1909 what will not be required (except, of course, by an examiner) until 1914, and the examiners can always be met with six months' sound teaching and a month devoted to their pet "tricks." If there is time, the students may "develope" the surface of a cone geometrically, and thus calculate the area, but that is the most that need be attempted.

It will be appropriate at this stage to deal with the projection of solids more fully. The earlier sections have included a good deal of plane geometry, and a little development and projection. The way was paved for this in the exercises to Sections XI. and XII. In solving the problems on roofs, heights, and distances, the student has unconsciously been developing notions of spatial relation which lie at the basis of projective drawing.

While it is not intended to go fully into the question of teaching techni al drawing in the present series of articles, it is perhaps worth while noting that the subject has two aspects. The one is mathematical in the sense that the main aim is measurement for the purpose of calculation. The other is representative in the sense that the main object is to show geometrical or space rather than numerical relations.

The principal object of the drawing in the first year's course is the former, and even when the object selected appears to give prominence to the latter aim, it will be found that this is only superficial. Even if the main object is not representation, there is no reason at all for avoiding real things. As a matter of fact, the wooden models of cube, prism, and cylinder are wooden embodiments of abstract geometrical notions, and, when wrongly used, belong appropriately to wooden methods of teaching. If the reader who doubts this will refer to Article II. (April number), he will see that these models belong to Steps 3, 4, and 5, and that their use is to help the pupil to compare, abstract, and formulate general notions or concepts from his whole mass of percepts of rectangular and cylindrical bodies, very few indeed of which are perfect cubes, prisms, or cylinders. As concrete aids to the formation of geometrical concepts by *young* pupils they serve a legitimate purpose.

All drawing helps the student to "visualise" objects; and, especially in the drawing of solids, the object and the drawing ought to be closely associated. This enables him not only to "read" a drawing—that is, to obtain a mental picture of the object from its flat representation—but also to understand at once how to set about making a drawing of an object which is shown to him.

The correct order of treatment in the kind of drawing under consideration is as follows :—

(*a*) The object is to be handled, measured, and a dimensioned sketch or sketches made on squared paper for convenience and economy of time.

(*b*) A measured drawing in plan elevation, end view and section, so far as the last two may be necessary, in orthographic projection—that is, in the kind of projection used ordinarily in mechanical drawing.

(*c*) A pictorial sketch may be attempted in any position.—Some teachers of drawing would place (*c*) first and (*b*) last. The practical effect of this is that the student draws *appearance* and not *construction* and *function*. A mechanical contrivance made from such a drawing frequently will not work. This statement is not necessarily an attack on mass drawing, which is now in such favour. A student can only draw what his mind can interpret from his visual impressions. The young child sees only broad masses at first; he sees no details of construction, and he imagines but vaguely, if at all, the purposes of the object. The students with whom we are dealing are bound to use their imaginations, and use them neither with childish vagueness nor artistic licence, but according to geometrical and mechanical laws.

Some suggestions as to the kinds of objects to be drawn and of the method of treatment will be found in the exercises. For the rest it has been assumed all through these articles that an elementary schoolboy understands the meaning of plan and elevation, and the simple projection of one from the other. If he does not, there is something wrong with the boy, or his attendance, or the school.

EXERCISES.

1. Find the weight of $6'' \times 1''$ iron bar per foot run, having given that 1 cubic inch of iron weighs ·26 lbs.

2. A gallon of water weighs 10 lbs., and a cubic foot of water weighs 6.25 lbs. How many cubic inches are there in a gallon?

3. A pipe 2 inches diameter delivers 20 gallons of water per minute. What is the velocity of the water in feet per second?

4. A bucket weighs 7 lbs. when empty, and holds 4½ gallons of water. Would you rather carry this bucket of water or a 56 lb. weight?

5. A stack of coal is 5 feet high, and has sloping sides. It is 9 feet wide at the bottom, and 6 feet wide at the top. Allowing 42 cubic feet per ton, what is the weight of coal per foot run of the stack?

6. A rectangular cistern is $4' \times 3' \times 3'$ deep. How many gallons of water will it hold, and what will be the weight if the cistern weighs 1 cwt.?

7. A circular tank is 6 feet diameter and 6 feet deep. How many gallons of water will it hold?

8. A cistern is ·8 m. long, 60 cm. wide, and 40 cm. deep. How many litres of water will it hold?

9. A cylindrical tank is 70 cm. diameter and 2 metres deep. By how much will the water rise for the addition of each 10 litres?

10. The Scotch Education Department require 8 square feet of floor space and 80 cubic feet of air space for each pupil. How many pupils should be allowed in a room 24′ × 36′ × 12′ high?

11. A rod of brickwork is 272 square feet, 1½ bricks thick. Find (*a*) the number of cubic feet in a rod of brickwork; (*b*) the number of bricks. Bricks laid in mortar may be taken as occupying a space 9″ × 4½″ × 3″.

12. If the brick is really 8¾″ × 4¼″ × 2¾″, how much mortar is there in a rod of brickwork?

13. A room is 30′ × 20′ × 12′, and the air is to be renewed at the rate of once every hour by a ventilating pipe. If the velocity in the pipe should not be greater than 1½ feet per second, find the cross section of the pipe, and say whether you would prefer one large or two smaller ones.

14. In measuring timber, nothing is counted less than 28″ in girth. A practical rule for the volume states: Multiply half the height to the 28″ girth by the square of a quarter of the middle girth. Find the cubic contents of a tree which has a middle girth of 60″ at a height of 20′ from the ground.

15. A cast-iron rain-water pipe is 2½″ diameter outside. The metal is ½″ thick; find the weight per foot run.

16. A cast-iron hot-water pipe is 4½″ outside and 4″ inside diameter. Find the weight of a 9′ length.

17. If the radius of a circle is *r*, what is the area? If the radius of another circle from the same centre is R, what is the area? What is the area of the annulus or ring between them? Simplify this formula as much as you can. If the formula represents the area of cross section of a pipe, find the volume per foot run, and for a length of *l* feet.

18. Examine a crankshaft when you have an opportunity, and make a dimensioned sketch of it. Then make just as many views of it as will give all the information as to shape and dimensions. From your drawing calculate as nearly as you can the weight of the shaft.

19. Make a drawing of the door of the room closed as you stand in front of it. Don't trouble about panels or other adornments. Along the bottom of the door draw the line which is formed by the wall and the floor, and call this *xy*. All your drawing above that line will be called elevation. Anything standing in front of the wall will appear with the wall as a background. If you had to draw the door looking from above, what would the plan be like, and where would it be?

20. Letter the hinged edge of the door A A′ (A′ at the top), and the outer edge B B′ (B′ at the top). Swing the door open until it stands at 45°, and imagine yourself looking down on it from the top. Note that everything in front of the wall when looked down on has the floor for a background. The edge of the door may be represented by a thick line. What is the angle with the wall (or with *xy*)? What is the length of this line? Draw it. Now, when standing in front of the wall, you are looking at it perpendicularly. Any point on the edge of the door will therefore be on a line drawn perpendicular to the wall. Draw a line from the outer edge of the door (looking from above) to *xy*. That is the point in the wall or vertical plane covered by the lower and outer corner of the door. How high is the upper and outer corner from the floor? How high will it be above *xy*? As the hinged edge of the door has not left the wall or vertical plane, you can now complete the elevation.

21. In Exercise 20, which line in the plan represents the true width of the door? Which line in the elevation represents the apparent width of the door? This is called the projection of the line representing the width. The line in the plan perpendicular to the *xy* line is called the projector. What sort of a triangle do the true length, the projector, and the projection form? Can you calculate in two ways the length of the projection?

NOTE.—The methods asked for are the squares on the three sides of a right-angled triangle, and the projection of a line *l* in any direction making an angle *a* with the original direction = *l* cos *a*. See Section XII.

22. The lower end of a gas bracket is 8′ from the floor of a room, and 10′ from one of the walls. Calculate its distance from the ground line, and verify your result by a drawing.

23. Draw the plan elevation and end view of a brick standing on the floor with its longest side parallel with and 2″ away from the wall.

24. Draw several parallel lines vertically an equal distance apart on the end elevation of the brick in Exercise 23. Set the brick on the floor with one corner touching the wall, and therefore the *xy* line, and one side making an angle of 30° with the wall. Draw the elevation, and find out whether in the elevation of the end with lines on it the lines are (*a*) longer, shorter, or the same size; (*b*) a greater, equal, or less distance apart.

25. Calculate the area of the end of the brick in the elevation obtained in Exercise 24.

ERRATA.

Section III., Exercise 11.—The steamer travels more rapidly against the stream than with it. The 6 minutes and 4 minutes should change places.

Section IV., Exercise 7.—Question 25 should be Question 5.

Section IX., Exercise 7.—Notes, centre *and* circumference.

Exer. 11.—How could you test whether the squares are *true*?

Education a Failure!

THE SCHOOL CURRICULUM.

BY JOHN PERKINS.

PERHAPS there is no part of our school system in which the substitution of inspection for examination has been so fruitful of change—of valuable change—as the infants' departments. For these I do not propose to propound any new gospel but we must recognise that the possibilities of the first few years of school life are immense. Whatever scheme of work is adopted, it is abundantly necessary that nothing shall be done which is calculated to reduce the school work to a general system of drill, which cannot but narrow the outlook and stultify the originality of the child. Once a bad habit has been engendered, once the natural spontaneity has been checked, once the child has become habituated to think as the teacher thinks and to say and do what the teacher wants, all after-efforts to reach and develop the *individual* will become correspondingly difficult. Therefore in these early years "*the what*" matters not so much as "*the how*," so long as the curriculum is designed to give play to every natural activity, and so long as nothing is done which afterwards has to be undone.

SOME DOUBTS AND SOME SUGGESTIONS.

Much of the talk that we hear concerning the gap existing between the infants' and the upper departments is mere bogey. It is a matter for genuine doubt whether the average child under seven should be subjected to a grounding in the three R's in preparation for the more serious grind which becomes more and more necessary as he passes through the upper department. Students of the child mind, ruminating and pondering upon the methods adopted to give a first notion of number, to overcome the difficulties of the printed word, and to master the technique of writing, must recognise that these matters do not lend themselves to that development of initiative and free play which should be the aim of education proper to this stage of school life. Undoubtedly of late years the methods of tackling these necessary accomplishments have become more enlightened; but the most skilful teaching can never rob them of their serious character; and, moreover, it is doubtful whether it is desirable to endeavour to adapt the methods of the sugared pill to all the subjects of instruction and to all stages of school life.

I would, then, that the schools for the little ones confined themselves in the main to such subjects and methods

as serve simply to widen the child's horizon, to develop his desire to do things for himself, and to feed his native love for the beautiful in nature, song, and story. Let these young people search out and talk about some of the wonders and beauties of nature; let them hear and repeat the classic stories which have delighted children all the ages down, not neglecting "the sweet story of old;" let them learn and repeat and sing the rhymes and songs and hymns which children love; let them construct over again in action and in speech some of the great and noble incidents of the world's history; let them fashion with their hands models in sand and clay and paper and wooden bricks; let them portray their imaginings in colour with crayon and brush; let them play and sing and dance under the open canopy of heaven; let them ramble freely in the meadows and over the hilltops.

Thus will the child mind be developed, the child soul quickened, the child body strengthened. Thus will the infant be prepared for the more severe mental, spiritual, and physical discipline of the senior school in a way which the old Education Department Schedule could never hope to accomplish.

All this is not mere theorising or idealising or reaching after impossibilities. These methods are being worked out, under ordinary conditions, in some at least of our infant schools. Often, I admit, this is being done much to the chagrin of the responsible heads of the senior departments, who still demand that the seven-year-olds shall know how to read and write and sum before their transfer to the higher realms of school life. Without posing as a prophet, one must foresee that those who desire to live out a reposeful existence, mechanically grinding out obsolete methods and aimlessly wandering through an obsolete curriculum, will find their mantle of self-satisfaction forcibly removed before many new Codes have seen the light. And what will the precisians do then, poor things?

The Older Scholars.

We turn now to the older children. At this stage let us remind ourselves of what is demanded of our primary school product. He must be endowed with character and intelligence. We have to fit him to make the best use of life, alike in the working hours and in the time of leisure; we have, as Mr. Blair recently affirmed, to rear the citizen and the industrial unit. How, then, can we best fashion our curriculum to this end? It would be impossible, even if it were desirable, to lay down a hard and fast curriculum suited to all circumstances, and it is no part of my intention to attempt to suggest a specific to reform the world. In this question of what is and what is not necessary for primary education, the only panacea is common sense.

It is not necessary to add another subject to the syllabus, or to increase the difficulty of the overburdened time-table. What we need most at this time is to be quite sure of ourselves. We must be quite confident that each portion of our curriculum has a justifiable aim; we must have a clear comprehension of what that aim is; and we must keep it ever in view. It is also essential that the teacher shall believe in what he teaches. A teacher out of sympathy with the course of instruction can never make it glow with life and reality. We must have a care, then, that we do not adopt some subject or method merely because it has become the prevailing fashion, and head teachers must hesitate to thrust new ideas or new notions upon a staff not fully converted to their efficacy and value. So, then, our curriculum, if possible, must be one to which every member of the staff must subscribe, the aim and purpose of which are apparent at every step.

Junior School Methods—The Primary Arts.

So much for the spirit. What of the matter? To solve the problem successfully, the upper school should be divided into junior and senior sections, in which the general policy will be the same, but with a difference in the method of attack.

It will not be necessary to continue all the subjects and all the methods which proved of value in the infants' department. If the child under seven has not acquired ideas which are false, or methods which are faulty, he should easily adjust himself to the altered circumstances which the more rigid demands of the upper school must make. Much of the striving among conscientious folk to ensure a direct continuation of the plan of campaign proper to the kindergarten has been a serious misdirection of zeal and energy. The well-planned kindergarten provides for all-round development. The scheme of work for the older scholars must make similar provision, but not necessarily on the same lines. Young people so often lack adaptability and resourcefulness, and the adjustments which have to be made in passing through the school life are valuable factors in an educational policy. The youngster who has learnt to fit himself into the general scheme of things has prepared himself to meet the manifold changes which the world has in store for most of us.

We must now get to work in real earnest to tackle the mechanical difficulties of the primary arts—reading, writing, and arithmetic. They have to be faced, and faced strenuously and with determination. The time-table must be arranged so that no lesson is conducted to the point of weariness. Some tasks, of course, will —well, will be tasks. It is a mistake to endeavour to make all our school work entertaining and interesting. The children must learn that life is not all a bed of roses. Bit by bit they must be subjected to tasks which call out determination, perseverance, and grit. When once they can be brought to realise the pleasure of surmounting difficulties and obstacles, they will readily set about the grind of acquiring what I have called the primary arts. Therefore, then, let there be no mincing. Let the children know that they have a stiff task before them. Let the teacher be strenuous and alert and sympathetic, and the class will bend to the work with a will. So, then, they will be led through the junior section to the age, say, of ten to eleven, when they will be able to read, to speak, and to write the mother tongue with some degree of fluency and understanding, and when they will be acquainted with the operations of the four arithmetical processes in all the customary notations.

The Subjects of Instruction—Periodical Examinations.

But beyond all this there must be ample scope for instruction which will add to the store of acquaintanceships and which will expand the sympathies and the interests. During this period the ground must be carefully prepared for the fuller and more practical work of the upper classes; but, to accomplish this effectively and adequately, we must abolish the old classification of subjects which still adorn the time-table and embellish the prospectus of many a primary school. Likewise,

we must cease to conduct three times a year a glorified species of the old parade day, than which there is nothing more calculated to develop mechanical methods of instruction which crush out all light and life, all originality and initiative. I have no hesitation in saying that the periodical examinations, as at present conducted, are more to be feared than the official examination of our early days. They form the chief obstacle to be removed before more enlightened methods can obtain a fair field. Some other method of supervision, some other method of checking progress, must be found, and that speedily, if we are determined to conduct our schools on sane lines

If the syllabus of instruction is arranged as I would suggest, it will be found impossible to continue these terminal monstrosities, and the difficulty of finding room on the time-table will vanish. Subject, then, the present practice to cool and dispassionate scrutiny, and it will be found that the educational pabulum for the juniors can be classified thus :—

1. Language and literature, including history.
2. Nature study, including geography.
3. Art and industry.
4. Number and measures.
5. Physical exercises, including music.

(To be continued.)

OUR COOKERY COLUMN.

BY ROSAMOND CANDY, FIRST-CLASS DIPLOMÉE, NORTHERN COUNTIES SCHOOL OF COOKERY.

AS September approaches one naturally thinks of game. There is very little game to be had from March to September. Pigeons can be purchased all the year round, but the game season proper is from September to March. The following is a list of the most common kinds used :—

Grouse in season from August 12 to December 10.
Blackcock in season from August 20 to December 10.
Partridges in season from September 1 to February 1.
Pheasants in season from October 1 to February 1.
Pigeons in season all the year round.
Hares and rabbits in season from October to March.
Wild duck in season from September to February.

Game is usually hung for a longer or shorter period, according to taste, in a cool, dry place. Game is generally cooked in the same manner as a roast fowl, although it is occasionally boiled when required for an invalid, and also makes a very superior *pie* when mixed with a small quantity of veal and ham.

All game should be drawn, singed, and trussed in the same manner as chicken, with the exception of removing the feet, which are left on game. The head is removed or not, as preferred.

Rules for Cooking Game.

1. In roasting game, *basting* is of the utmost importance, as otherwise the meat is certain to be dry and flavourless.

2. Game must not be over-cooked. Allow three-quarters of an hour for an ordinary sized grouse or pheasant, half an hour for partridges.

3. Game should not be allowed to stand about before serving, but should, on the other hand, be served immediately it is ready.

4. A salad is usually served with game. Red currant or cranberry jelly is substituted in place of the old-fashioned bread sauce, which by most people is considered best of all adjuncts accompanied with a good gravy and browned crumbs.

5. Cut lemon or orange is usually served with wild duck, also with boiled game, white sauce being also served with the latter.

The following shows a week's menus, introducing various dishes of game :—

Sunday : *Breakfast.*—Porridge, boiled eggs, toast and marmalade. *Dinner.*—Boiled salmon, cucumber, and green peas ; * roast grouse,* bread sauce, and chip potatoes ; raspberries and cream ; cheese and biscuits. *Supper.*—Pressed beef and salad, fruit tart.

Monday : *Breakfast.*—Porridge, fried cutlets and tomatoes, brown bread scones and jams. *Dinner.*—Mayonnaise of salmon,* roast hare,* boiled potatoes, French beans, stewed plums and custard. *Supper.*—Potted meat, brown bread and butter, watercress.

Tuesday : *Breakfast.*—Fried filleted plaice, milk rolls and marmalade or jam. *Dinner.*—Summer stew of lamb, boiled potatoes, boiled fruit pudding, cheese and celery. *Supper.*—Macaroni and cheese, Swiss cream.

Wednesday : *Breakfast.*—Cold boiled ham, tea-cakes and butter, toast and marmalade. *Dinner.*—Tomato soup, roast wild duck, boiled parsnips and baked potatoes, conservative pudding.* *Supper.*—Boiled mackerel and parsley sauce, cheese and biscuits.

Thursday : *Breakfast.*—Grilled ham and mushrooms, scones and butter and jam, fresh fruit. *Dinner.*—Hare soup, roast pheasant, brussel sprouts, potato chips and bread sauce, open tart of greengages. *Supper.*—Cold pheasant and salad, cheese and celery.

Friday : *Breakfast.*—Porridge, lamb's liver and bacon with tomatoes, fresh strawberries and bread and butter. *Dinner.*—Boiled halibut and parsley sauce, veal cutlets, new potatoes and green peas, custard,* creams with strawberries. *Supper.*—Pigeon pie and salad, cheese and biscuits.

Saturday : *Breakfast.*—Porridge, cold baked fresh herrings, poached eggs on toast, rolls and butter, jam. *Dinner.*—Green pea soup,* roast partridges, cauliflowers and potato chips, raspberry tart and cream. *Supper.*—Lobster salad.

To Boil Green Peas.—Have plenty of boiling water, to which is added a tablespoonful of salt to each half gallon of water, also one *knot of sugar* instead of *soda*, which breaks the peas. A sprig of mint, too, is added to improve the flavour. Ten to fifteen minutes is allowed to cook fresh peas ; if the peas are stale, a little longer time will be required. Peas must be cooked slowly, and when they are cooked they will sink to the bottom of the pan. Serve in a hot tureen with a bit of fresh butter and a dust of pepper.

Mayonnaise of Salmon. *Ingredients.*—Any cold salmon, salad and cucumber, salad dressing. *Method.*—Remove all bones and skin, break up the salmon into neat flaky pieces, prepare the lettuce, break leaves into pieces, and place layer of these on a dish, and sprinkle lightly with the salad dressing. Next place layer of salmon, and so on until all is used up. Decorate the top with the little tufts and hearts of lettuce, tomato, and cucumber. Serve with bread and butter. (Recipe for salad dressing see August number.)

Conservative Pudding. *Ingredients.*—Three ounces savoy and ratifia biscuits, the yolks of two eggs and the white of one, two tablespoonfuls of rum or brandy, half-

* Recipes follow.

pint milk, one tablespoonful apricot jam. *Method.*—Grease a mould well, place the biscuits into it in layers with a little apricot jam between each layer, pour in rum, and allow to thoroughly soak; beat eggs, and add the milk. Pour into mould and cover with greased paper. Steam for three-quarters of an hour.

Custard Creams with Strawberries. *Ingredients.*—Half-pint custard, half-ounce gelatine, one gill whipped cream, one pint strawberries. *Method.*—Make custard with half-pint milk and two eggs, add the gelatine, allow to cool, and when beginning to set beat this mixture and stir in the whipped cream. Place a little in small wetted moulds (darioles), then a layer of the strawberries (previously picked) in neat pieces. Continue this process until the moulds are full. Allow to set, and serve with a little strawberry syrup sauce, made by boiling the juice of the strawberries with a little sugar until it becomes thick and syrupy.

Green Pea Soup. *Ingredients.*—One pound green peas, one quart good white stock, salt and pepper, one knot sugar, a stalk of mint, a little spinach (one handful), half-gill cream. *Method.*—Boil the peas in the stock with the salt, sugar, and pepper, also mint and spinach; pass all through a sieve, add the cream, and make very hot without reboiling. Before serving add some peas boiled separately in water.

The following are two good recipes for home-made wine (liqueurs):—

Sloe Gin.—To every pint sloes add one pint unsweetened gin and one pound barley sugar, one ounce of sweet and bitter almonds skinned and chopped. Mix all together, and shake every day for a month. Cork well and store. This will be ready for use at the end of six months. It improves with keeping.

Cherry Brandy.—This liqueur is made in exactly the same manner, substituting *Morello* cherries for the sloes, and French brandy in place of the gin.

The following recipe hardly comes under our heading of *Cookery*, but is such an excellent recipe for furniture polish that our readers will find it very economical and useful:—

Furniture Cream.* *Ingredients.*—Five ounces common beeswax, one ounce curd or maple soap, one ounce white wax, one pint turpentine, one pint soft water. *Method.*—Boil the water, and let it get cold. Shred the wax and soap into this, stand it in a cool oven until all is melted, add the turpentine drop by drop, stirring all the time until cold. Bottle and cork closely. The mixture is better for being kept.

SEASONAL LESSONS IN NATURE STUDY.

BY THE REV. ALFRED THORNLEY, M.A., F.L.S., F.E.S., SUPERINTENDENT OF NATURE STUDY TO THE NOTTINGHAMSHIRE AND LEICESTERSHIRE COUNTY COUNCILS.

BOTANICAL STUDY.

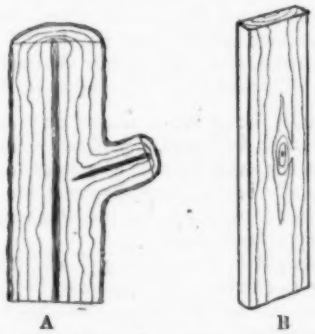
THE WOODY STEM (*Continued*).

THE following three subjects should be simply dealt with by the teacher, but it is very necessary that all should be well illustrated by actual specimens of woods.

1. *Medullary rays.*—When a smoothed transverse section of oak or beech stem is examined, there will be noticed a number of lines of a paler colour, radiating from the centre, and cutting the annual rings at right angles. In the two trees mentioned these are very plain. If now the sections be viewed through a lens (even of weak power), it will be found that, in addition to the broader lines, numerous narrower ones are seen between them. All these, both broad and narrow, constitute the medullary rays. These lines are the cut edges of sheets of tissue, the cells of which are largely employed in conducting food from the bast to the wood, and water from the wood to the bast. In other woods they facilitate the horizontal "translocation" of food. They also store the reserve food (starch, etc.). The class must be taught to notice where the rays begin and where they end. How numerous are they? What is their relative width? Are they all the same width? Then several woods should be compared with respect to the rays, and a short comparative table drawn up.

2. *The grain of wood.*—(See diagram in last number.) To show how the beautiful appearance of "grain" is produced, a pine or larch section should be cut (i) in a direction at right angles to the radius (tangential), and (ii) in the direction of the radius. It will then be seen how the alternate light and dark rings contribute to the effect. In sections of oak or beech it will also be seen how the medullary rays assist in producing some of the most beautiful graining. By rolling layers of plasticine of two colours on a roller, and then sectioning the cylinder thus produced, the formation of graining can readily be followed, as the cylinder of plasticine can easily be cut in any direction. An examination of the deal furniture in the room will furnish numerous examples of graining, and students can ascertain with a little trouble the section of the wood.

3. *Knots.*—If sections of branches or boles of young pine trees be procured, there will be certain to be seen in them many buried branches; and it will readily be understood how the sections of these branches, occurring in planks, etc., produce the well-known appearance of "knots." A blackboard sketch, however, should be made (see diagram), illustrating more particularly the



A B

A. Four-year-old stem of Pine, with branch three years old.
B. Plank with knot.

formation of knots by the buried branches. In this way only will the class come to understand how branches can be buried.

Children must be taught to compare and recognise the timber of the common British trees with respect to such phenomena as (i) heart and sap wood; (ii) rough and smooth bark; (iii) the medullary rays, whether visible or invisible to the naked eye; (iv) the annual rings; (v) the vessels of the wood, whether they are large or small. A simple table of classification should

* Not to be taken inwardly.—ED.

be drawn up. Then a brief lesson may be given on the monocotyledonous stem. A section of asparagus or maize does nicely. This must be carefully compared with the dicotyledonous stem.

Modifications of Stems.

The teacher must be provided with good examples of all these modifications. They are easily got.

(i.) *Thorns and spines.*—These are often modified shoots, as is shown by the fact that they frequently produce buds and leaves—for example, sloe, hawthorn, buckthorn, etc.

(ii.) *The runner or stolon.*—This kind of stem runs over the ground, has long internodes, and adventitious roots growing out from the nodes—for example, strawberry, creeping cinquefoil, creeping buttercup.

(iii.) *The rhizome or rootstock.*—An underground stem. The internodes may be long, as in couch grass (*Triticum repens*), or thick and fleshy, as in iris.

A very good example of the form with long internodes is garden mint. The so-called creeping roots of this plant, if carefully washed, will be seen to bear scale leaves, like all true rhizomes. A stouter example, and one that can easily be preserved in spirit, is "Solomon's seal." This is quite the best for class demonstration.

(iv.) *The tuber.*—The well-known potato will illustrate this form best. Young potatoes still attached to the stalk, and older ones that have been sprouted, and in this state preserved in spirit, are best for demonstration purposes. Jerusalem artichokes should also be examined. Compare these with the *tuberous roots* of the dahlia.

(v.) *The corm.*—A short, thick, fleshy stem, covered by a few scale leaves, and bearing one or more buds at its apex, as in crocus, gladiolus, bulbous buttercup. (For complete examination of these see the lesson on bulbs in the February number.)

(vi.) *The bulb.*—A very short stem, upon which are arranged a number of thick, fleshy scale leaves, which either very closely (onion) or very loosely (lily) overlap each other. Examples—onion, tulip, narcissus, snowdrop, hyacinth, lily. (See February number.)

(vii.) *Cladodes.*—Stems modified so as to appear like leaves. The best example is butcher's broom. This plant should be gathered in May, when the leaf-like structures (cladodes) are bearing flowers, which originate in the axil between tiny scale-like true leaves and the cladode.

The teacher would do well at every opportunity to get hold of good examples to illustrate such a lesson as the above. Many bulbs, etc., can be procured in the dry state, or kept in methylated spirit. Thus a lesson on the stem could be given even in winter, though it is much more interesting in summer.

Climbing Stems.

The present month will be found a good one for this study. The following short outline of a lesson on this interesting subject is suggested. (*a*) The stimulus to climbing is light-hunger; without light a plant cannot feed. (This subject will be more fully dealt with later.) (*b*) Modes of climbing.

(i.) *Twining stems.*—The growing end of such stems performs a singular movement of revolution in a circle or ellipse (*nutation*), different plants taking different times to perform this revolution. For example, the hop is said to perform a revolution in two hours eight minutes. Then each species revolves in a particular direction. The hop and the honeysuckle revolve in the same direction as the hands of a clock (clockwise), whilst the convolvulus revolves in the opposite direction (counter clockwise). A pretty experiment may be made to illustrate this. A young convolvulus or hop-plant should be chosen just before it has begun to twine. It should be grown in a small pot, and then the experiment arranged as shown in the diagram, which will explain itself. The warmer the day, the better the results obtained. It will readily be seen how this movement of nutation enables the plant to climb up a stick or

Diagram showing the arrangement for exhibiting the "nutation" movement of the growing end of a young convolvulus. A plumb line is dropped from the tip at regular intervals, and a dot made on a sheet of white cardboard below.

string. The class should be asked to collect examples of plants which climb in this manner. A twining plant growing freely in the open should have its support removed, and then the class should notice the remarkable tactics of the plant in its effort to find something to twine around.

(ii.) *Tendril climbers.*—The ordinary sweet pea and the little wild yellow meadow vetchling (*Lathyrus pratensis*) are good examples of tendril climbers. The class must note that tendrils may be either reduced shoots (for example, vine and bryony) or reduced leaves (for example, most leguminous climbers). Also that tendrils may be *simple*, as in bryony, or compound, as in sweet pea.

Simple experiments conducted on the principle of the one described under (*b*) (i) will show that the ends of a tendril (if compound, the ends of its branches), as well as the whole tendril, *nutate*. Experiments can pretty easily be made to measure the time taken by a tendril to form its first coil on coming into contact with a suitable object. Attention must particularly be called to the remarkable phenomenon of the reversed spiral. (Teachers should consult a very fine lesson on this subject in *Round the Year*, by Professor Miall.) From this the class should get some idea of what is meant by "irritable" organs. A tendril is such an "irritable," sensitive organ. Lastly, it must be noted that tendrils represent different parts of leaves. Thus they may represent:—

(*a*) Stipules—for example, smilax.

(*b*) Petioles—for example, clematis, tropeolum, fumitory.

(*c*) Whole leaflet (mid-rib)—for example, Leguminosæ.

(*d*) The mid-rib—for example, cobæa.

The adhesive tendrils of the small Virginia creeper (*Ampelopsis*) also make a very interesting study.

(*To be continued.*)

Our Readers' Column.

STUDIES OF BOOKS THAT ARE WORTH WHILE.*

BY SUSAN CUNNINGTON.

V.—Tennyson (1809-1892).

1. "A Dream of Fair Women." 2. "Ode on the Death of the Duke of Wellington." 3. "Maud: a Monodrama." 4. "The Coming of Arthur" and "The Passing of Arthur." 5. "Tiresias."

So far we have studied creative literature in the department of fiction alone. But if it may be granted that in fiction it makes its widest appeal, we may well claim that it makes its deepest appeal in poetry. To the rich store of English literature in this form the works of Alfred, Lord Tennyson, are an appropriate and inspiring introduction. His contribution to our national heritage of "true thought in melodious expression" offers an embarrassing variety of choice. The selection named above serves at least as representative of the poet's genius in dealing with some of the permanent subjects of poetic thought.

Amongst these are nature; love and its many aspects; life, individual and social; the aspirations of the time, which find expression in the religious and political conceptions of the individual and the state; and the things of the past, its ideals, achievements, and legacy. The sincere and appreciative student does not desire to be told of the compiled judgments of scholars and critics by means of which poets are ranged in classes and ranks; but it is helpful to be given some guide as to the relation of a poet to his own age, and as to his outlook and temperament. Some poets have been seers and interpreters of the forces and currents and issues amidst which they lived, anticipating and moulding thought, and in every subject they treated dwelling upon and developing the elements of universal interest. Others have been rather the articulate expression of the best accepted thought of their time, and have faithfully presented and reflected the contemporary ideals and aspirations with which they were in contact. Of such was Tennyson.

An introductory word is desirable before mentioning this selection in detail. Tennyson, during his long life, saw the passing away of old England and a new England arise in its place. The struggle with Napoleon and its issue placed Great Britain in the forefront of European nations; her position as the great trading, carrying, and manufacturing people was established; the Crimean War and the Indian Mutiny kept alive the military and militant instincts of the race; the old aristocratic rule disappeared, and the middle classes became dominant. The influences which in France had brought about the avenging Revolution resulted in our own land in a gradual but vital change in the habit of thought as to the relations of the governing and the governed. With Catholic Emancipation and the great Parliamentary Reform of 1832 there was ushered in the new era of freedom of thought and liberty of person which heralded the coming democratic rule.

Mechanical inventions, and especially the use of steam power, transformed the conditions of labour, communication, and international intercourse; while the revelation of science brought much besides inventions and improvements as aids in wealth production. The great theory of evolution bound together many isolated strands of scientific truth; and the dreams of idealists took shape in ameliorative schemes for the general well-being and in the spread of educational opportunities. Before his death there had been accomplished the removal of political and university disabilities of Dissenters, repeated extensions of the franchise, the introduction of the ballot, and the establishment of a compulsory system of state education.

At the accession of Queen Victoria, Tennyson had published two volumes of poems, one in conjunction with his brother, and one containing only his own work. This included "A Dream of Fair Women," the earliest in our selection. Ten years later appeared "The Princess," so strangely prophetic in fact, and yet devoid of prophetic insight, and blending his profound and knightly reverence for women with the limited conception of their sphere and capacities characteristic of the time. For sixteen years Tennyson worked at the great elegy on his friend Arthur Hallam, "In Memoriam," a massive monument of poetic friendship, almost encyclopædic in its range. In the same year as that of its publication, 1850, he was, on Wordsworth's death, made Poet Laureate.

The "Ode on the Death of the Duke of Wellington" was his second official composition, the first being the "Ode sung at the Opening of the Great Exhibition," and the opportunity was nobly seized of doing honour at the same time to Nelson. In 1855 the monodrama "Maud" appeared, and in it we hear impatience with some of the political and social conflicts of the day.

In common with most poets Tennyson had early planned to compose some great work, and at length resolved to take for his subject King Arthur and his Knights. So far back as 1839 he wrote the first of these idylls, "The Coming of Arthur," and in 1870 "The Passing of Arthur." At varying intervals between these periods there appeared one or more of the old stories of chivalry woven into beautiful language, and finished with extreme and delicate care. In 1885 "Tiresias and other Poems" were dedicated to his great contemporary Robert Browning, whose genius in outlook, sympathy, scope, and method was so different from his own.

Thus it is seen that these works of Tennyson belong to the same period as the fiction hitherto studied in the novels of George Eliot, Charles Kingsley, and Charles Dickens. Most of them are sufficiently remote from the history of the time to justify the poet's withdrawal from the turmoil of contemporary life into the seclusion of an artist bent on perfecting his gift. In "A Dream of Fair Women" Tennyson does homage, both in method and directly, to his great forerunner Chaucer, whom he mentions with the courtly title "Dan" after Spenser, though only one of the characters from Chaucer's "Legend of Good Women" appears in the "Dream." In this Tennyson shows his characteristic reverence for women and his delicate appreciation of the times and

* These are mentioned in the books to be read by students preparing for the next Certificate Examination.

surroundings of those rememberable heroines. Helen of Troy, Iphigenia, Cleopatra, Jephthah's daughter, Fair Rosamond, the daughter of Sir Thomas More, Joan of Arc, and Queen Eleanor, wife of Edward III., succeed each other in the glowing pageant. Tennyson's knowledge of plant life is gracefully introduced in his description of the "old wood" where he saw the vision; and in the selection of this for his scene he is recalling a very old poetic tradition, so old that Dante in the thirteenth century was but following it when he placed the beginning of his "Comedy" in a "gloomy wood" and termed it "The Vision."

The "Ode on the Death of the Duke of Wellington" is a stately and impressive commemoration not only of a great soldier, but also of a worthy representative of the "old order" which was so surely passing away in 1852. The first six divisions of the ode bring before us the scene of the funeral, the great procession, the troops, the gun-carriages, the crowds, the tolling bells, the arrival at the cathedral, and the nearness of the grave to the tomb of Nelson. In the seventh part is the poet's warning to the nation of the dangers of reckless straining for greater liberty, his intense sympathy with and appreciation of past struggles, then as always leading him to shrink from any present endeavour, and to imagine that such stand on an entirely different plane.

The next and the concluding divisions recover again the note of disinterested eulogy, and the ode ends in a high strain of reverent prayer :—

> "Speak no more of his renown,
> Lay your earthly fancies down,
> And in the vast cathedral leave him.
> God accept him, Christ receive him."

In "Maud," the first of his longer poems, Tennyson blends the emotional element of a passionate love story with a hot rebuke of the growing love for ease and wealth, and the social and political deterioration accompanying it. Thus the poem opens, leading on with a half-resentful, half-contemptuous description of the faultless beauty of his old playfellow. In part four, the occasion of his meeting her face to face and her cold disdain form the text of some rather bitter reflections, and the coming drama is heralded by the unphilosophic but inevitable protest,

> "You have but fed on the roses and lain in the lilies of life."

Roses and lilies, and luscious scents and beautiful sights, and sweet sounds and impassioned speech are the predominant elements in the next divisions of the poem; dainty lyrics, vivid word-painting, melodious phrases, and glowing fancies succeed each other in a revel of imaginative fervour. For pure music and high delight in expression "Maud" recalls Tennyson's early model, Keats; and the songs and descriptive passages worthily prelude the later mastery in lyrical poetry on which his fame chiefly rests. Their superb mastery of expression made them easy to learn and to repeat; their melody caught even the heedless ear; their technical perfection successfully challenged the sternest judgment, and Tennyson's supremacy as master of musical expression was securely established. In more leisured days young people setting out to study his poems busied themselves with compiling concordances of various kinds—nature, felicitous epithets, atmospheric effects, similes, and comparisons, and so on. "Maud" is a treasure-house of all these, and even our busy generation may find pleasure in considering them; while to read the musical verses and to appreciate the metrical effects are at once an education and a delight.

"The Coming of Arthur" and "The Passing of Arthur," which, in the completed form of the "Idylls of the King," are the opening and the closing sections, very fitly represent the poet's method of dealing with the subject he chose for his greatest work. We are reminded that Milton, in casting about for some heroic theme, at first thought of taking King Arthur, and rejected it in favour of the stupendous one of the Fall of Man. Tennyson had in his early years been greatly attracted by the history and personality of the old British hero; and "Morte d'Arthur," afterwards expanded into the concluding idyll "The Passing of Arthur," appeared in 1842, whilst it was only in 1885 that the series was completed. The treatment of the legends which had grown up around the personality of King Arthur and his knightly warriors closely follows the old rendering of Sir Thomas Malory, but the setting and the emphasised allegory are the poet's own.

Instead of the rugged simplicity of the Malory stories, so clear, so direct, so ungarnished, each of the idylls is like a highly wrought and polished gem; the thought richly embroidered with illustration and simile, and the language and phrasing in the highest degree musical and impressive. Many of the most beautiful expressions have become familiar to generations of people whose bent is not literary, and have roused in them a consciousness of the value of ideals in life and conduct. In "The Passing of Arthur" occurs the fine summary which expresses the great and continuous succession and development of thought and action which we term progress :—

> "The old order changeth, yielding place to new,
> And God fulfils himself in many ways,
> Lest one good custom should corrupt the world."

Here, too, is the noble tribute to the power of spiritual things, and especially of the uplifting of the human soul to the Divine in prayer :—

> "More things are wrought by prayer
> Than this world dreams of. Wherefore let thy voice
> Rise like a fountain for me night and day.
> For what are men better than sheep or goats
> That nourish a blind life within the brain,
> If, knowing God, they lift not hands of prayer
> Both for themselves and those who call them friend?
> For so the whole round earth is every way
> Bound by gold chains about the feet of God."

The soft and soothing effect of Tennyson's blank verse becomes very apparent as we read and hear the examples in this selection. The difference between it and the blank verse of Milton is most striking; it will be interesting in a later paper to consider in what the difference chiefly consists.

In "Tiresias" is an impressive and dramatic rendering of the lament of the blind monarch of ancient Greece. It recalls Milton's "Samson Agonistes," and by deliberate suggestion the old-world Eastern poem of "Job,"

> "O that I were as in the years of old!"

With this Tennyson returns to the history and legends of classical antiquity from which he took his early subjects of Ulysses, Tithonus, and Lucretius, and with which he was most fully in sympathy. Always he is a little aloof, removed from, the actual things of the present time; dwelling in a world of thought where things and events have become mellowed by time, familiar in story and song, and already partly idealised.

The Scientific Historian.

PROFESSOR J. W. ALLEN, who occupies the Chair of Modern History at Bedford College, treats his own subject, which is a branch of the humanities, with adequate seriousness. He is not content to deal with it in a scientific manner, but claims for it a place among the sciences (a totally different matter), forgetting or ignoring the fact that the issues are complicated by that disconcerting element of mind which so often upsets the calculations and occasionally renders somewhat humorous the conclusions of the psychologists. The study of mankind can never be placed upon the same footing as the study of sulphuretted hydrogen.

We have, however, to thank the professor for a highly interesting, lucid, and occasionally eloquent exposition * of the aims and methods of the true scientific historian, or, more correctly, the scientific historical worker.

> "He is concerned essentially and almost all the time with problems of causation. He must, of course, ascertain how things were superficially before he can even ask any question. But there are very many facts and aspects of fact with which he is not concerned at all. He needs facts only to explain other facts. What he is looking for is real relations—that is, causal relations. If he can find these, he wants no more; if he cannot find these, he has found nothing. A fact is only important to him because of its bearing upon something else. An event is only important so far as it has results, and the results of an event are, to him, an absolute measure of its importance. Everything to him is result first and cause afterwards, and so far as it is not cause it is unimportant.....
>
> "The scientific historian has no business with the dramatic or the picturesque or the tragic or the comic or the pathetic.....
>
> "The blue pencil of the scientific historian would be run right through almost all the purple passages of our history.....
>
> "A writer who feels a strong bias for or against Catholicism or Protestantism or any other 'ism,' or for or against democracy or aristocracy, is no scientific historian. What is needed is an intellectual detachment so complete that all the hopes of humanity fail to arouse a dominant emotion."

The man who sacrifices himself in radium research is a tame hero compared with the worker who will thus devitalise his nature in the sacred cause of scientific history. Possibly the reward is great, but, judging from the example given by Professor Allen of the practical application of the method, the results are not very striking. He takes the events immediately preceding the outbreak of the Hundred Years' War, which we have all been taught was begun because Edward III. claimed the crown of France, and by a process of reasoning leads us readily to believe that the real causes of the war were on the whole commercial, and that the claim to the French crown was put forward only to give an excuse for leading an English army into France.

We had, however, already reached this opinion. The fact that the claim was an empty thing is insisted upon even by unscientific historians, and there is scarcely a student of the period who, if he thinks about the matter at all, does not feel that the king must have had other pressing reasons for drawing the sword. Professor Allen merely gives us the chief of these reasons, among which there is one which is so full of humanity that we are inclined to bless the scientific historian for the fruit of his work—Edward III. found that the proceedings of certain Frenchmen threatened to interfere with the regular supply of wine to the royal table!

* *The Place of History in Education.* By J. W. Allen. (Blackwood.)

It need scarcely be said that the scientific historian will have nothing to do with the picturesque stories which have served to introduce most of us to history. The attitude is unreasonable, even from a scientific point of view. Let the modern student who is thirsting for spade work dig deep to the origins of these legends. If he traces any one of them to writers or witnesses contemporary with the subject of the story, he has done useful historical work. If such a story could be told or invented about some prominent man or woman, it will serve to throw a flood of light upon the character of that person. The story of the burnt cakes could never have been invented about a monarch who lacked that quiet humour which has so often distinguished leaders of men. It seems childish to assert that this is not history because it never happened. Its truth is immaterial. The fact that it was told and received credence at the time is the really important matter.

The scientific worker in history may delve for the facts, but he must as a rule hand them over to a historian who can make use of all the elements which go to make up real history, among which must be included the so-called embroideries of the subject, which have so unreasonably offended the uncomfortable veracity of the modern history school. The building must be reared upon the foundations well and truly laid by the scientific worker, but the architect and the artist must have their share in the shaping and the adornment of the fabric. To the scientific historical student, we learn, the assent of King John to Magna Charta is "not dramatic." If he can assure us that it actually took place, and that the terms of the Charter are beyond question, our ideal historian will assuredly not neglect the dramatic aspect of the great event which is well-nigh overwhelming.

In dealing with the function of history in education, Professor Allen claims for the subject a high place as an intellectual power. With its so-called "practical" value he will have little or nothing to do.

> "The amount of 'practical usefulness' to be got out of the teaching of history is really minute. No doubt it may enable you to understand a certain number of references in books, newspapers, and conversation that otherwise would be quite dark. It may possibly enable you to understand why a certain class of people engaged in our educational controversies are called 'Cromwellians.' It may throw a humorous gleam upon some picture in the Royal Academy. It should certainly help you to appreciate the value of political references to 'feudalism' and of much current talk about the 'lessons of history.' Possibly these in their small way are practical values. Any real knowledge of history will certainly help you to take a rational view of current politics and of social and economic questions of the moment. But is this of practical value? If you are to be a professional politician, it may be doubted whether a knowledge of history will not be a positive hindrance to your career. Your references, your arguments drawn from history will be much more sharply pointed if you know next to nothing about it, than they can be if you have any true appreciation of the elusive, complex reality. And if you have attained to the scientific point of view in matters historical, you will certainly never fit in nicely with any political party. So that, on the whole, we may conclude that the teaching of history can never to any serious extent become a part of technical education. Our questions, Why do we want to teach history? and, Why do we want to teach anything? must be considered without any reference at all to that kind of education. We do not want to teach history in order to enable people to understand journalistic allusions."

The foregoing paragraph proves that our author

possesses literary qualities of a high order, in spite of his severely scientific outlook. Possibly some day he will give us a history of a period which will exhibit the force and humour which distinguishes our last quotation. The professor is himself fearful that scientific history may be very dull, but in himself he gives us hope. The danger lies in the dullness of the ardent disciple, especially of the gentler sex; for the scorn of a woman of the new school for the human qualities of history is a thing of terror.

Professor Allen deals lucidly with the kind of history that must be taught in schools. History proper must not be commenced before the age of fourteen. Previous to that he would give to young people a preliminary drilling in what we must unwillingly call civics, a subject which only lives when the teacher is full of vibrant life and capable of making anything interesting. We ourselves would use the historical story, even if it be untrue, to prepare the way for definite history. But our readers will find Professor Allen's hints on junior teaching full of suggestion and helpfulness.

With regard to later teaching the professor makes an eloquent plea for enlarging the student's outlook by showing the position of our own country among the nations of Western Europe, and breaking down the insularity of our older methods of teaching history. As many of our readers know very well, the history of Western Europe is now dealt with, at least in outline, in most of our modern secondary schools; but his arguments will doubtless serve to convince the waverers of the folly of trying to teach English history as a thing apart from the record of the great movements in Western Europe from the time of Charlemagne onward.

We recommend all our readers to make a careful study of Professor Allen's book. It will help the history teacher to clearer conceptions of his work. It will inspire the class teacher with a deeper consciousness of the sacredness of his calling. It will break down hampering prejudice, and arouse that intellectual opposition which is the spice of life.

MODERN SCIENCE NOTES.

BY J. G. M'INTOSH, B.SC., SECONDARY SCHOOL, GATESHEAD.

Science Teaching in Public Schools.

THE Board of Education has issued in pamphlet form a report on "Science Teaching in Public Schools represented on the Association of Public Schools Science Masters."

After a review of the early development of science teaching in certain schools, the report states that of the external influences which helped science to establish its position among the subjects of study, the most potent factor was the ever-increasing importance attached to science subjects in examinations conducted by the universities. Much also was due to committees of inquiry appointed at various times by the British Association, and notably to the committee which recommended at the Bath meeting in 1888 "that chemistry should be taught in schools, first and mainly on account of the mental training it affords; and secondly, for the sake of its applications and its direct bearing on the facts of everyday life." In the twenty-one years which have elapsed, the science teaching in our public schools has been revolutionised. The report deals largely with the army schools, and the development in them of science teaching which has taken place since the inclusion of science subjects in army examinations. The reform has compelled more attention to be paid to equipment both in staffs and in laboratory work.

An encouraging feature of the report is the recognition of the claims and importance of science by the governing bodies and other authorities responsible for the administration of public school finances. Laboratories and classrooms specially designed and equipped for science teaching are the rule. Direct experimental work by the students themselves is now the universal practice. Specialisation is seldom allowed until the student reaches the upper parts of the school, and generally in this case by those students only who desire a training for some particular profession or examination.

The pamphlet, which is No. 17, can be obtained from the publishers to the Board of Education, and is interesting reading. Might we suggest that the Board now conduct an investigation into the general effect of the introduction of the bursar system into the secondary school, its influence on the whole character of the curriculum and preparation for examination. We venture to predict that the report would be startling, and not wholly edifying. Many secondary schools are at the present time in danger of losing their distinctive individuality, and becoming mere training grounds for the dumping of amateur teachers into the primary schools. In some cases the whole curriculum is being modelled on the requirements of the preliminary certificate examination for teachers, or some other examination which procures exemption from this test, and thereby enables the Local Education Authority of the district to draw the large monetary bribe offered by the Board of Education. The policy is shortsighted, and only another instance of the ineptitude which has characterised the *régime* of the present permanent Secretary to the Board. The pupil-teacher centre, which he fondly hoped he had abolished by transference to the secondary school, still dominates the latter. We hope to see an investigation shortly, and will even pardon a "prefatory memorandum" to the report full of Morantian platitudes.

Blériot.

Europe is drying up! The insularity of Great Britain, already destroyed by M. Blériot, is gradually passing away, and future *Dreadnoughts* will be relegated to the scrap heap. M. Marcel predicted it some years ago; and now Herr Walser has measured the rate of desiccation, and proved that hundreds of European lakes have entirely disappeared, while a large number have shrunk to vanishing point. In the canton of Zurich alone, where, in 1660, there existed one hundred and forty-nine lakes, Herr Walser can only paddle in seventy-six, and barely half of this residue remain undiminished in size. The same story is told of German and Russian lakes, and similar evidences of progressive aridity are to be seen in Western Asia. Meanwhile should the projected signalling with Mars prove successful, we might elicit information from the Martian inhabitants as to how to inaugurate a system of canals. The North Sea, Baltic, and Mediterranean are not yet reported missing.

The Planet "O."

M. Gaillot contributes an excellent article to the *Comptes Rendus* on the possibility of an extra-Neptunian

planet. Professor Pickering places his hypothetical planet "O" in the same part of the sky as M. Gaillot; but, as was pointed out in *Nature* at the time of publication of Professor Pickering's calculations, his basis of a mass of two and a half times that of the earth could not possibly produce sensible perturbations in Uranus. M. Gaillot's planet has five times the mass of the earth, and would produce inequalities in Uranus exceeding a second of arc. The question arises as to whether the observed discordances in Uranus are sufficiently large to point unmistakably to some unknown planet.—An inequality of a second of arc appears to exist, but the constants used in the orbit of Uranus are arbitrary, the observations liable to small errors, and the theory of interaction of known planets is not perfect. Like Professor Pickering, M. Gaillot bases his hypothetical planet upon Uranus, and not Neptune. It appears that the motion of Neptune is in agreement with the tables, and that no extra-Neptunian planet can exist of a mass and epoch to produce sensible inequalities in the motion of Neptune since its discovery. This considerably narrows the field where this planet can be found.

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Lord Rayleigh contributes to *Nature* of July 15 a short account of the theory of the Crooke's radiometer. He approaches the problem from the point of view of regarding the gas as so attenuated as to lie entirely outside the field of the ordinary gaseous laws.

"It is true that in making this supposition we may be transcending the conditions of experiment, but the object is to propose the problem in its simplest form, and thus to obtain an easy and unambiguous solution. We suppose, then, that the gas is so rare that the mutual encounters of the molecules in their passage from the vanes to the envelope, or from one part of the envelope to another part, may be neglected; and, further, that the vanes are so small that a molecule, after impact with a vane, will strike the envelope a large number of times before hitting the vane again.

"Under ordinary conditions, if the vanes and the envelope be all at one temperature, the included gas will tend to assume the same temperature, and when equilibrium is attained the forces of bombardment on the front and back faces of a vane balance one another. If, as we suppose, the gas is very rare, the idea of temperature does not fully apply, but at any rate the gas tends to a definite condition, which includes the balance of the forces of bombardment. If the temperature be raised throughout, the velocities of the molecules are increased, but the balance, of course, persists. The question we have to consider is what happens when one vane only, or, rather, one face of one vane, acquires a raised temperature.

"The molecules arriving at the heated face have, at any rate in the first instance, the frequencies and the velocities appropriate to the original temperature. As the result of the collision, the velocities are increased. We cannot say that they are increased to the values appropriate to the raised temperature of the surface from which they rebound. To effect this fully would probably require numerous collisions. Any general increase in the velocity of rebound is sufficient to cause an unbalanced force tending to drive the heated surface back. If we follow the course of the molecules after collision with the heated surfaces, we see that, in accordance with our suppositions, they will return by repeated collisions with the envelope to the original lower scale of velocities before there is any question of another collision with the heated face. On the whole, then, the heated face tends to retreat with a force proportional both to the density of the gas and to the area of the surface."

Suppose that the molecules after collision with the heated face rebound with the same velocities, $v + dv$, as they would have if the temperature were the same throughout, the pressure would be increased in the ratio $v + (v + dv) : 2v$ or $1 + dv/2v : 1$.

On the other hand, if the temperature were actually raised throughout, the pressure according to the usual gaseous laws would be increased in the ratio $(v + dv)^2 : v^2$ or $1 + 2dv/v : 1$. On this hypothesis the unbalanced increment of pressure on the heated face is one quarter of the increment which would be caused by a general rise of temperature to the same amount. The supposition that the mean free path of a molecule is large in comparison with the linear dimension of the vessel is extreme, but in the extreme form all that is necessary is that the mean free path should be large compared with the vane. The velocities with which the molecules impinge are then independent of the fact that the face of the vane is heated.

A COURSE IN HISTORY AND LITERATURE.

BY MABEL A. BROWN.

DURING the next twelvemonth I purpose giving suggestions month by month for the teaching of history in boys' and girls' schools. I have adopted the periodic plan and not the concentric; and in accordance with this, I propose dealing with British history up to 1400 in this first year's course. It is impossible, owing to the small amount of space at my disposal, to sketch the scheme for the whole year in this September number; but as it is much better for all our work if we are able to look ahead a little and plan for what is coming, I have given a brief outline of the course for the first six months. Month by month the scheme will be worked out in greater detail. In order to put the material in the clearest and most practical way for "practical teachers," I have divided the school into three grades—Grade I., consisting of Standards I. and II.; Grade II., comprising Standards III. and IV.; while Grade III. embraces the whole of the school above Standard IV.

There are a few general suggestions that ought to be of value to those teachers who adopt the scheme. It is of the first importance in telling history stories, especially to juniors, that we should employ the art of word painting to the greatest advantage. The best, and therefore most successful, teacher of history is the man or woman who has a lively imagination and sympathy, and a good flow of language. By this means only can the past be made to live and become real to the minds of young children. Word-painting should be supplemented by good pictures. In the best history readers good pictures abound. Many of these are from paintings by eminent artists, who have made a special study of ancient times, manners, and customs. In the lower standards, where I believe it is not generally customary to use history readers, the children should be allowed to look at the history books of the upper standards, and examine and discuss

the illustrations which bear upon the period they are studying. All the children should be encouraged to bring pictures of this kind to school, and a wall sheet or special album should be kept for them. Messrs. E. J. Arnold of Leeds have a very fine set of history pictures for class teaching purposes, thirteen of which deal with our present period (*A. L. Historical Incidents*).

Local history should be a prominent feature of the work. This country is rich in historical remains, and every district has its history and usually its special antiquarian. Every teacher should make it his or her business to be as well acquainted as possible with the story of the county and district in which the school is placed. Excellent handbooks are now published on the history of the various counties. Visits should be paid whenever possible to places of interest near. Geography, "the associative science," as Herbart calls it, should be interwoven with history to the greatest possible extent. Physical features have played a great part in determining local history, and the two subjects should go hand-in-hand. It is impossible to do more than give suggestions in this direction, as every district has its own special history. Maps, made by the teacher, should be used, to show the development of the country from the earliest times of which we have authentic record. These will be of special interest to the older children.

Children in the schools of large and ancient towns will be able to make great use of the local museum and art gallery. Pictures dealing with the town at different periods of its growth, and pictures dealing with historical subjects, ancient coins, drawings and plans of old castles and battlefields, suits of armour, prehistoric implements, ancient titles, pottery, models of ancient streets and dwellings, old manuscripts, old portraits, specimens of earliest weaving and other handicraft—all these may be studied by groups of children with a well-informed teacher from time to time. The curator of specimens is usually only too pleased to give a humble seeker after truth the benefit of his wide research. Children should always take notebooks, both for information and sketches. Notes should be entered in brief. These may be elaborated in essay form afterwards.

Picture postcards will be found a very valuable aid to history teaching. Children should be encouraged to collect any that bear upon the subject in hand. Little friends and cousins may send pictures of other districts which are perhaps richer in ancient historical interest. Holidays may be a time for augmenting the store, and scholars will be only too pleased to relate the stories of the past which cluster round the spot where they have spent a week or two, if they are encouraged in this direction. Communication between town and country schools for the purpose of nature study has become quite common. Might not the correspondence be also utilized for the study of history? A wider interest, sympathy, and knowledge would be secured in this way. Town scholars might help their country schoolfellows to a great extent by writing letters, giving details of their visits to museums, art galleries, and other places of interest which are inaccessible to rural children. Long frames can be made for these postcards in various ways. Older boys can make them at the woodwork class, younger boys in the cardboard modelling lesson, while the juniors can cut them out of dark brown paper. The measuring necessary will be a good exercise for them in the use of a ruler. A dado of these postcards looks most effective in the classroom.

I hope to give other suggestions next month, together with further mention of books that I have found useful in preparing the scheme. For September I mention—

History.

Stories from British History (A. and C. Black, about 9d.); *Oxford Manuals of English History I.* (Blackie, about 1s. 6d.); *Roman Britain and Germany* (Blackie, 6d.); *A First History of England I.* (Horace Marshall, 1s.); *The Four Nations* (Collins, about 9d.); *Things New and Old I. and III.* (Cassell, about 9d.); *The Making of the Homeland I.* (Collins, about 1s. 6d.).

Literature.

The Celtic Wonder World (Horace Marshall, 1s.); *Malory's Morte d'Arthur* (Horace Marshall, 1s. 6d.); *Knights of the Round Table* (Blackie, 6d.); *Bright Story Readers*—51, *King Arthur*; 62, *Ancient British Heroes*; 64, *Idylls of the King* (E. J. Arnold, 4d. each); *Idylls of the King* (Edward Arnold, 6d.); *The Mabinogion* (Everyman's Library, 1s.); *Tennyson's Poems.*

*Poetry for Recitation.**

The Call of the Homeland I. and II. (Blackie, about 2s.); *English Poetry for the Young* (Blackie, about 1s. 6d.).

NOTES ON SCHEME FOR SEPTEMBER.

History.—The class teacher should study the history to be taken each month from as many reliable sources as possible. There is not very much to be known about our Celtic forefathers before the Roman invasion, but children are always particularly interested in prehistoric times. May this not be our argument for the validity of the parallel drawn by some of our great educators from Plato to Herbert Spencer between the child and the race? Messrs. E. J. Arnold's picture of ancient British life will do much towards giving a clear and comprehensive knowledge of this period. Reference libraries should be consulted, and the latest books available studied.

I have lately looked through several sets of history readers, and have been especially struck with the following:—

Gateways to History (Edward Arnold); *Readings in English History from Original Sources* (for upper standards) (Blackie); *British History in Periods* (Blackie); *A First History of England* (Horace Marshall); *Highroads of History* (Nelson); *Things New and Old, Books I. and III.* (Cassell); *The Making of the Homeland I. and II.* (for upper standards) (Collins).

Literature.—In taking the stories of King Arthur, I have adopted a different treatment for each grade, selecting only such stories as seemed most suitable. *Malory's Morte d'Arthur* would form an excellent reading book for Grade III., while Arnold's *Bright Story Readers* (4d.) are suitable for Grade II., and the *Celtic Wonder World* for Grade I. Tennyson's poetic version should be utilised as far as possible at the teacher's discretion. The rhythm, the exquisite music of high-sounding phrases, the noble ideals of chivalry, the abounding references to nature, will charm children of all ages, and do much to create a true and pure literary taste. For the two lower grades, at all events, the

* I have not found any poems suitable for children that bear on the period prior to the Roman invasion, but *The Call of the Homeland* contains excellent selections suitable for fostering a love of home and the true patriotic spirit.

planet. Professor Pickering places his hypothetical planet "O" in the same part of the sky as M. Gaillot; but, as was pointed out in *Nature* at the time of publication of Professor Pickering's calculations, his basis of a mass of two and a half times that of the earth could not possibly produce sensible perturbations in Uranus. M. Gaillot's planet has five times the mass of the earth, and would produce inequalities in Uranus exceeding a second of arc. The question arises as to whether the observed discordances in Uranus are sufficiently large to point unmistakably to some unknown planet. An inequality of a second of arc appears to exist, but the constants used in the orbit of Uranus are arbitrary, the observations liable to small errors, and the theory of interaction of known planets is not perfect. Like Professor Pickering, M. Gaillot bases his hypothetical planet upon Uranus, and not Neptune. It appears that the motion of Neptune is in agreement with the tables, and that no extra-Neptunian planet can exist of a mass and epoch to produce sensible inequalities in the motion of Neptune since its discovery. This considerably narrows the field where this planet can be found.

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"It is true that in making this supposition we may be transcending the conditions of experiment, but the object is to propose the problem in its simplest form, and thus to obtain an easy and unambiguous solution. We suppose, then, that the gas is so rare that the mutual encounters of the molecules in their passage from the vanes to the envelope, or from one part of the envelope to another part, may be neglected; and, further, that the vanes are so small that a molecule, after impact with a vane, will strike the envelope a large number of times before hitting the vane again.

"Under ordinary conditions, if the vanes and the envelope be all at one temperature, the included gas will tend to assume the same temperature, and when equilibrium is attained the forces of bombardment on the front and back faces of a vane balance one another. If, as we suppose, the gas is very rare, the idea of temperature does not fully apply, but at any rate the gas tends to a definite condition, which includes the balance of the forces of bombardment. If the temperature be raised throughout, the velocities of the molecules are increased, but the balance, of course, persists. The question we have to consider is what happens when one vane only, or, rather, one face of one vane, acquires a raised temperature.

"The molecules arriving at the heated face have, at any rate in the first instance, the frequencies and the velocities appropriate to the original temperature. As the result of the collision, the velocities are increased. We cannot say that they are increased to the values appropriate to the raised temperature of the surface from which they rebound. To effect this fully would probably require numerous collisions. Any general increase in the velocity of rebound is sufficient to cause an unbalanced force tending to drive the heated surface back. If we follow the course of the molecules after collision with the heated surfaces, we see that, in accordance with our suppositions, they will return by repeated collisions with the envelope to the original lower scale of velocities before there is any question of another collision with the heated face. On the whole, then, the heated face tends to retreat with a force proportional both to the density of the gas and to the area of the surface."

Suppose that the molecules after collision with the heated face rebound with the same velocities, $v + dv$, as they would have if the temperature were the same throughout, the pressure would be increased in the ratio $v + (v + dv) : 2v$ or $1 + dv/2v : 1$.

On the other hand, if the temperature were actually raised throughout, the pressure according to the usual gaseous laws would be increased in the ratio $(v + dv)^2 : v^2$ or $1 + 2dv/v : 1$. On this hypothesis the unbalanced increment of pressure on the heated face is one quarter of the increment which would be caused by a general rise of temperature to the same amount. The supposition that the mean free path of a molecule is large in comparison with the linear dimension of the vessel is extreme, but in the extreme form all that is necessary is that the mean free path should be large compared with the vane. The velocities with which the molecules impinge are then independent of the fact that the face of the vane is heated.

A COURSE IN HISTORY AND LITERATURE.

BY MABEL A. BROWN.

DURING the next twelvemonth I purpose giving suggestions month by month for the teaching of history in boys' and girls' schools. I have adopted the periodic plan and not the concentric; and in accordance with this, I propose dealing with British history up to 1400 in this first year's course. It is impossible, owing to the small amount of space at my disposal, to sketch the scheme for the whole year in this September number; but as it is much better for all our work if we are able to look ahead a little and plan for what is coming, I have given a brief outline of the course for the first six months. Month by month the scheme will be worked out in greater detail. In order to put the material in the clearest and most practical way for "practical teachers," I have divided the school into three grades—Grade I., consisting of Standards I. and II.; Grade II., comprising Standards III. and IV.; while Grade III. embraces the whole of the school above Standard IV.

There are a few general suggestions that ought to be of value to those teachers who adopt the scheme. It is of the first importance in telling history stories, especially to juniors, that we should employ the art of word painting to the greatest advantage. The best, and therefore most successful, teacher of history is the man or woman who has a lively imagination and sympathy, and a good flow of language. By this means only can the past be made to live and become real to the minds of young children. Word-painting should be supplemented by good pictures. In the best history readers good pictures abound. Many of these are from paintings by eminent artists, who have made a special study of ancient times, manners, and customs. In the lower standards, where I believe it is not generally customary to use history readers, the children should be allowed to look at the history books of the upper standards, and examine and discuss

the illustrations which bear upon the period they are studying. All the children should be encouraged to bring pictures of this kind to school, and a wall sheet or special album should be kept for them. Messrs. E. J. Arnold of Leeds have a very fine set of history pictures for class teaching purposes, thirteen of which deal with our present period (*A. L. Historical Incidents*).

Local history should be a prominent feature of the work. This country is rich in historical remains, and every district has its history and usually its special antiquarian. Every teacher should make it his or her business to be as well acquainted as possible with the story of the county and district in which the school is placed. Excellent handbooks are now published on the history of the various counties. Visits should be paid whenever possible to places of interest near. Geography, "the associative science," as Herbart calls it, should be interwoven with history to the greatest possible extent. Physical features have played a great part in determining local history, and the two subjects should go hand-in-hand. It is impossible to do more than give suggestions in this direction, as every district has its own special history. Maps, made by the teacher, should be used, to show the development of the country from the earliest times of which we have authentic record. These will be of special interest to the older children.

Children in the schools of large and ancient towns will be able to make great use of the local museum and art gallery. Pictures dealing with the town at different periods of its growth, and pictures dealing with historical subjects, ancient coins, drawings and plans of old castles and battlefields, suits of armour, prehistoric implements, ancient titles, pottery, models of ancient streets and dwellings, old manuscripts, old portraits, specimens of earliest weaving and other handicraft—all these may be studied by groups of children with a well-informed teacher from time to time. The curator of specimens is usually only too pleased to give a humble seeker after truth the benefit of his wide research. Children should always take notebooks, both for information and sketches. Notes should be entered in brief. These may be elaborated in essay form afterwards.

Picture postcards will be found a very valuable aid to history teaching. Children should be encouraged to collect any that bear upon the subject in hand. Little friends and cousins may send pictures of other districts which are perhaps richer in ancient historical interest. Holidays may be a time for augmenting the store, and scholars will be only too pleased to relate the stories of the past which cluster round the spot where they have spent a week or two, if they are encouraged in this direction. Communication between town and country schools for the purpose of nature study has become quite common. Might not the correspondence be also utilized for the study of history? A wider interest, sympathy, and knowledge would be secured in this way. Town scholars might help their country schoolfellows to a great extent by writing letters, giving details of their visits to museums, art galleries, and other places of interest which are inaccessible to rural children. Long frames can be made for these postcards in various ways. Older boys can make them at the woodwork class, younger boys in the cardboard modelling lesson, while the juniors can cut them out of dark brown paper. The measuring necessary will be a good exercise for them in the use of a ruler. A dado of these postcards looks most effective in the classroom.

I hope to give other suggestions next month, together with further mention of books that I have found useful in preparing the scheme. For September I mention—

History.

Stories from British History (A. and C. Black, about 9d.); *Oxford Manuals of English History I.* (Blackie, about 1s. 6d.); *Roman Britain and Germany* (Blackie, 6d.); *A First History of England I.* (Horace Marshall, 1s.); *The Four Nations* (Collins, about 9d.); *Things New and Old I. and III.* (Cassell, about 9d.); *The Making of the Homeland I.* (Collins, about 1s. 6d.).

Literature.

The Celtic Wonder World (Horace Marshall, 1s.); *Malory's Morte d'Arthur* (Horace Marshall, 1s. 6d.); *Knights of the Round Table* (Blackie, 6d.); *Bright Story Readers*—51, *King Arthur;* 62, *Ancient British Heroes;* 64, *Idylls of the King* (E. J. Arnold, 4d. each); *Idylls of the King* (Edward Arnold, 6d.); *The Mabinogion* (Everyman's Library, 1s.); *Tennyson's Poems.*

*Poetry for Recitation.**

The Call of the Homeland I. and II. (Blackie, about 2s.); *English Poetry for the Young* (Blackie, about 1s. 6d.).

NOTES ON SCHEME FOR SEPTEMBER.

History.—The class teacher should study the history to be taken each month from as many reliable sources as possible. There is not very much to be known about our Celtic forefathers before the Roman invasion, but children are always particularly interested in prehistoric times. May this not be our argument for the validity of the parallel drawn by some of our great educators from Plato to Herbert Spencer between the child and the race? Messrs. E. J. Arnold's picture of ancient British life will do much towards giving a clear and comprehensive knowledge of this period. Reference libraries should be consulted, and the latest books available studied.

I have lately looked through several sets of history readers, and have been especially struck with the following:—

Gateways to History (Edward Arnold); *Readings in English History from Original Sources* (for upper standards) (Blackie); *British History in Periods* (Blackie); *A First History of England* (Horace Marshall); *Highroads of History* (Nelson); *Things New and Old, Books I. and III.* (Cassell); *The Making of the Homeland I. and II.* (for upper standards) (Collins).

Literature.—In taking the stories of King Arthur, I have adopted a different treatment for each grade, selecting only such stories as seemed most suitable. *Malory's Morte d'Arthur* would form an excellent reading book for Grade III., while Arnold's *Bright Story Readers* (4d.) are suitable for Grade II., and the *Celtic Wonder World* for Grade I. Tennyson's poetic version should be utilised as far as possible at the teacher's discretion. The rhythm, the exquisite music of high-sounding phrases, the noble ideals of chivalry, the abounding references to nature, will charm children of all ages, and do much to create a true and pure literary taste. For the two lower grades, at all events, the

* I have not found any poems suitable for children that bear on the period prior to the Roman invasion, but *The Call of the Homeland* contains excellent selections suitable for fostering a love of home and the true patriotic spirit.

OUTLINES OF SCHEME FOR FIRST HALF-YEAR FROM SEPTEMBER 1909 TO MARCH 1910.

History.	Literature.			Poetry for Teachers' Reading.
September.	*Grade I.*	*Grade II.*	*Grade III.*	(*Selected Lines for Class Recitation.*)
Days before History: — Our Celtic forefathers, their country and its civilisation; their mode of life; their religion; their communication with other lands.	Celtic Fairy Tales. Story of Cuchulainn. Story of Cwyll. Story of Conedda. The Children of Lir. (*Celtic Wonder World.*)	Stories of British heroes. Story of Branwen. Story of Manawyddan. Story of Conall. The Lady of the Fountain. (*The Mabinogion.*)	King Arthur and his noble knights. The Coming of Arthur. The Marriage of Arthur. Sir Gawain and the Green Knight. Geraint and Enid. Sir Galahad and the Holy Grail. Story of Excalibur and Queen. Morgan Le Fay's plot.	Idylls of the King. (Tennyson.) Sir Galahad. ,, Sir Lancelot and Queen Guinevere. ,, Morte d'Arthur. ,, Tintagel. (Sir Lewis Morris.)
October.				
The Roman Invasion:—Story of Julius Cæsar and his home. Roman Britain and its civilisation. Roman remains in Britain to-day.	Stories of King Arthur. Story of Excalibur. Story of Sir Gawain. Story of Geraint and Enid.	The Coming of Arthur. Story of Sir Gareth. Balin and Balan. The Passing of Arthur.	Story of Sir Tristram. Lancelot and Elaine. The Passing of Arthur.	Boadicea. (Cowper.) Caractacus.
November.				
The Saxon Invasion: — The Saxon invaders and their home and customs. The introduction of Christianity. Effects on Britain.	Story of a Saxon hero. (*Boys and Girls of Other Days.*)	Story of Beowulf and his heroic deeds. Cædmon's Dream. Last days of Bede.	Story of Beowulf. Cædmon and his writings. Bede and his writings. (*First Book of English Literature.*)	Beowulf's Expedition. (Longfellow.)
December and January.				
The Danish Invasion: — The home and life of the Danes. Danish heroes — Olaf, Siward, Havelock, Canute, etc. Story of Alfred. Danish remains, and effects of Danish rule in Britain.	Stories of King Alfred. Olaf the Brave. Agil the Archer. Story of Canute. (*Stories from British History.*)	Story of Canute. King Guthrum and his vow. Guy of Warwick. King Eric and the poet Egil. (*Stories from British History.*)	Story of Balder. (Matthew Arnold's poems.) King Alfred and literature. Story of Havelock. Story of King Horn. (*Stories of the Middle Ages.*)	The Skeleton in Armour. (Longfellow.) To an old Danish Song Book. ,, Tegner's Drapa (Balder). ,, The Discoverer of the North Cape. ,, The Saga of King Olaf. ,, Alfred's Map.
February.				
The Norman Conquest:—Stories of Harold, Godwin, Hereward the Wake, the Conqueror, etc. Effects of the Conquest.	Story of Harold and his fight for his kingdom. (Lord Lytton.)	Hereward the Wake. (Charles Kingsley.) Battle of Hastings. (*First Book of English Literature.*)	Harold. Hereward the Wake. Cynewulf and his writings.	The Norman Baron. (Longfellow.) Harold. (Tennyson.)

tales should be first *told* by the teacher—not read, so that the additional aid and charm of eye, tone, and gesture may be added to the narrative. Then passages from Tennyson or Malory should be read by the teacher before any class reading is attempted. This will give the children a keen interest in the subject, and materially improve the whole tone of their rendering when they come to read the story from their books.

Certain lines should be selected at the discretion of the teacher for the children to commit to memory. The selection of these passages will, of course, depend upon the grade for which they are to be used. The children's opinions should always be invited on what is read—which passages they like best? why? Which is the most beautiful phrase? Which gives a picture to the mind? Which lines refer to nature? Are the similes true? etc. If literary taste is created and fostered in this way right through the child's school career, we may hope from the men and women of the future a wise and intelligent use of the books in our free libraries, and a rapid decrease in the production of the sensational, extravagant, and baneful literature (it must be called for want of a suitable word) that floods the market to-day.

For the future, monthly schemes will be worked out in much greater detail, and I hope to be able to suggest suitable handwork, at all events for the juniors.

N.U.T. NOTES.

BY ALLEN CROFT.

The Executive—

EVERY year, when the moment arrives, a sub-committee examines clause by clause—almost word by word—in the Code of Regulations issued by the Board of Education for the conduct of primary schools. (As a matter of fact, *all* sets of Regulations issued from Whitehall receive almost microscopical scrutiny; but my reference to-day is only to what is usually known as the "new" Code.) This sub-committee's recommendations go first to the Education Committee, and after a keen and searching overhauling are sent on to the full Executive for final adoption, after which they are transmitted to the Board of Education, either by letter or by public or private deputation, as the circumstances of the case appear to require. It is my privilege, as chairman of the Education Committee, to introduce the report to the Executive; and it speaks well for the thoroughness of the work done, and the soundness of the decisions arrived at by the sub-committee, to reflect that hardly ever are its recommendations challenged.

The famous "Circular 709" had already prepared us for the vital changes in the 1909 Code. When Mr. Runciman's revolutionary document appeared on the eve of Easter, *for the sake of the good that was in it* the Executive refrained from adverse criticism, realising all the time the gross unfairness of the possible penalising of existing non-collegiate certificated teachers. The wisdom of the policy of inaction is amply justified by the result, for the provisions of the Code adequately safeguard the position of all teachers already certificated. It is true the Board of Education, in a prefatory memorandum, state that they have withdrawn nothing from Circular 709, even though all its contents are not yet incorporated in the Code; but I venture to prophesy that this is only Sir Robert L. Morant's pleasant and characteristic method of preparing to withdraw from an absolutely untenable position. On the Code sub-committee we had the assistance of Miss Broome, Messrs. Blenkinsop and Taylor (the latter gentleman a most promising recruit at Russell Square), and I was specially careful to ascertain, in view of certain wild statements that the Executive neglected the interests of the non-collegiate certificated teachers, that the steps we proposed to take had their full and whole-hearted approval. I do not personally recede an inch from the position I first laid down at the Executive some four or five years ago—that the acting teachers' examination ought to be abolished, and that for the purposes of the Code all existing certificated teachers ought to be regarded as fully trained; and I am glad to think that this view is accepted by many prominent and influential "non-colls."

* * *

and the Code.

USUALLY the new Code calls more often for criticism and condemnation than for approval, so it was with more than ordinary gratification that I rose at the last Executive meeting before the recess to ask the Executive to express their cordial appreciation of the staffing changes introduced into Articles 9–14, and to offer their sincere thanks and congratulations to the President of the Board of Education on the great educational reforms for which he is responsible. Mr. Runciman gave the deputation from the N.U.T. which waited on him nearly six months ago the impression of great earnestness and deep sincerity; and despite the fashion in which he has been bombarded and abused from many quarters, most manfully has he adhered to his resolution. I am going to burn my boats, and state that he is far and away the best *Education* minister since my active connection with the Executive began, fifteen years ago; and in writing this, I recall offhand the names of Mr. Acland, Sir John Gorst, Sir William Anson, Mr. Birrell, and Mr. M'Kenna. Further, so far as I can judge, he seems to have an able and sympathetic lieutenant in Mr. C. P. Trevelyan, who lacks neither knowledge, judgment, nor courage, for he is not afraid to meet the teachers where he can be promptly replied to, from the platform of a public meeting. Frankly, I hope much from the present *regime* at Whitehall.

Probably every member of the Executive has done his share in keeping before the country the necessity for smaller classes and more highly qualified teachers, yet it is not invidious to single out for especial mention two class masters—my own able vice-chairman, Mr. W. B. Steer of Derby, and Mr. A. W. Dakers, B.A., of Newcastle—who have neglected no opportunity of pressing for reforms long overdue. The next important departure in the Code must be the entire elimination of the words "average attendance" for staffing purposes. The children must be provided for *as individuals*, and I am sure that before long Mr. Runciman will realise the absurdity of saying, *in effect*, that the more irregular children are in their attendance at school, the greater is the number that one person can teach! And, of course, all imperfectly qualified teachers must improve their qualifications, or be prepared, after reasonable notice has been given, to see that the profession of a teacher is no longer open to them.

My final word is one of satisfaction that a reform which the Union has long advocated—namely, uniform grants for all children over five years of age—is not the least important of Mr. Runciman's innovations.

BLÉRIOT, OR ENGLAND NO LONGER AN ISLAND!

ON Monday morning, July 25, 1909, M. Blériot flew across the English Channel from Barraques, near Calais, to a field inland of Dover Castle. So the brief announcement will run down the ages. But what's the moral of it, an there be one? "England no longer an island!" shrieked the scare lines of Continental and American newspapers, "Prosperity and supremacy of the Britisher doomed!" "The beginning of the end!" and so forth, and so forth. It is impossible as yet in the initial stages of these wondrous doings even to speculate with satisfaction on what may happen, but we can analyse our present position.

Roughly speaking, the effects of this "insular position" of ours may be summed up as giving us (1) a favourable climate; (2) freedom and security in commerce and trade; (3) a navy, and with it the command of the sea; (4) a very large share of the carrying trade of the world. We owe much, then, to our geography: is the conquest of the air going to upset everything?

First of all our climate. Obviously that will remain untouched by any number of aeroplanes; so far so good, at all events. Secondly, the freedom and security with which we have prosecuted our manufactures and our trade. Undoubtedly our trade supremacy began because we were untouched by Continental troubles; and having gained the start, we kept ahead for a long time. Nor can we see how aeroplaning will affect our position in this respect more than the ordinary trade competition does, and this in a virulent form we have been facing for the last twenty-five years: But here enters another question, and an awkward one, and one must tread warily. Our Free Trade policy owes something to the sea. For conversely, how could foreign governments, legislating for poorer peoples, avoid some system of "protection" in competition with traders themselves protected by an insular security? And must aviation perforce make us all Tariff Reformers, no matter what our principles be? That is a question which may be left to debating societies.* Thirdly, our navy and the command of the sea. This is the main home scare at present. The loss of this command would undoubtedly injure the second of our points, and utterly annihilate the fourth (the carrying trade). But before any danger arises, certain difficulties have to be overcome by the aeronauts.

The action of the air overhead has to be understood. We lie at the bottom of an ocean of air, with all sorts of eddies and complicated vertical and horizontal currents above us, about which we know but little. We know they are there by watching birds, which are always adjusting themselves to these movements. Indeed, the whole question of the weather is a gigantic difficulty, and until the aeronauts can rise superior to its vagaries they can effect but little. Then there are the difficulties of landing and of carriage. It's not the actual fall that hurts, as the Irishman said, but the sudden stoppage at the bottom—as Blériot himself knows.

And as to weight, air will support a heavy body moving horizontally at great speed—that is, the resistance will, if the speed be great enough, take the form of support. Maxim's aeroplane weighed three tons, and it rose into the air directly it attained a speed of thirty-six miles an hour. Blériot travelled much faster than this, but his monoplane weighed only about a hundred pounds. It looks as if this question of carriage, of weight, is largely a question of speed, and there are obvious limitations here. Carriage of goods will therefore have to be left for long to dirigible balloons, which, by the way, are somewhat easy targets in times of war.

But enough; this conquest of the air is a wonderful thing—when it comes off. That we do not go off our heads over it even now is largely because our papers keep us so well supplied with news on every detail. A *Times* leader writer said it is the most impressive event that has happened since Columbus discovered the New World, but no one thought much of that until long after the actual "discovery." True, there were no newspapers, but it was not until the effects of the discovery began to make a difference in men's lives that people began to talk about it, and poets to write about it. We too shall continue to regard these flights as of small importance until we begin to get, say, our eggs and bacon and our tea by A. P. Blériot XXXII. And meanwhile, in our present bewilderment, we can barely speculate on what the future holds for us. It may change the fate of nations.

* Undoubtedly.—ED.

THE USEFUL KNOWLEDGE LIBRARY.

(Hodder and Stoughton.)

The British Race. By John Munro. The author believes this to be the first attempt to bring the modern results of anthropological study and research before the public in familiar language, and it is certainly an attempt that required to be made. The book will doubtless, as he says, "tend to destroy some errors regarding the origin and pedigree of the nation which have infected life and literature for ages." The great mass of material now available can hardly be dealt with satisfactorily within the limits of so small a volume, and probably most readers will find that the destructive portions are more convincing than the constructive; but it deserves the attention of all intelligent teachers nevertheless.

Geographical Discovery: How the World became known. By Joseph Jacobs. With twenty-four maps. This is a simple and lucid summary of the whole course of geographical discovery, told in the narrow limits of some two hundred small pages. It is well done, and the book should be in the hands of every teacher of geography.

Thought and Feeling. By Frederick Ryland, M.A. This is an admirably simple and clear exposition of the main facts of psychology, specially adapted to the general or unscientific reader. The author has not attempted to write anything beyond a "clear outline," which may "serve as an introduction to the study of some portions of the field of psychology," but he has produced a book which will probably be of more general use than many larger and more pretentious text-books.

Germ Life: Bacteria. By H. W. Conn. With thirty-four illustrations. Bacteriology is comparatively a new science, and one whose chief results to many people has been to fill life with new terrors. There was therefore great need for such a volume as this, which ought to bring comfort to those who are obsessed by the terror of "microbes," seeing that the writer declares that "these organisms are to be regarded not primarily in the light of enemies, but as friends." The descriptions of the friendly and useful bacteria and their work is most interesting and instructive, while the study of pathogenic bacteria is duly followed by a chapter dealing with methods of combating their attacks. The book is sure to fulfil a useful function.

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A CORRELATED SCHEME BASED UPON ÆSOP'S FABLES.

(*Second Month—September.*)

SUGGESTIONS FOR CARRYING OUT THE SCHEME.

Reading.—The reading book used in connection with this scheme is *Æsop's Fables*, published by Arnold, Leeds. This book is rather difficult for an average class, and does not give a systematic course of word-building; but its use has been found to give the children an increased power of intelligent reading. A carefully graded set of primers should be used to give sufficient practice in the *mechanical difficulties of reading*.

Writing.—The passage chosen for writing each month is divided into weekly portions and taught carefully. On Friday the children are allowed to write passage learned in *Fair Books*. These books are interleaved with the sketches for colouring. These sketches may be taken from *Stead's Books for the Bairns, No. 1.*, and from *Æsop's Fables*, 1d., published by Spencer and Mark. They are to be enlarged and struck off from the hektograph. The colouring is done either with brush or chalks.

NOTES ON FIRST MONTH'S WORK.

Writing.—The old Lark said, "Now it is time for us to leave our nest, for the farmer is going to cut down the corn himself."

Object Lessons.

The Lark. Illustrations.—Picture of lark and nest. Sketch on blackboard of lark singing.

Method. Habits.—(*a*) Nest built on ground. Eggs four or five, grayish-yellow colour. (*b*) Feeds on worms, grubs, seeds. (*c*) Sings in spring and summer while soaring in the air. Soars so high as to become a mere speck, then drops suddenly, but not close to nest, which it reaches by creeping through long grass. (*d*) Flies in flocks in autumn and winter.

General appearance.—(*a*) Colour: brown, mixed with white and yellow; resembles colour of ploughed land, so serves as protection from enemies. (*b*) Wings long. (*c*) Tail long and forked. This aids rapidity of flight. (*d*) Beak short, slightly arched above. This enables lark to hold worm in beak. (*e*) Legs slender; claws long and curved.

Teacher's Illustration.

Reading Lesson. Sound *ark*.—One day we went to the park with my dog Mark. We sat down on the grass, when, hark! we heard a lark sing. Mark began to bark. "Do not bark, Mark," we said; "let us hear the lark." Just then the sky grew dark. "The lark will not sing now," said Tom; "larks do not sing in the dark."

Corn (Oats). Illustrations. Ears of corn (oats).—Grains in different stages of germination. (A cigar box with one side removed and replaced by a piece of glass makes an inexpensive and good germinating case. Place a piece of brown paper inside, next glass. Fill the box loosely with moss or cotton wool. Push the seeds between the brown paper and the glass, and keep the

Teacher's Illustration.

moss or wool damp.) For town children, a good illustration of a cornfield may be made by means of the sand tray and ears of corn. Part of the tray to represent stubble. Picture of ploughing and sowing.

Method. Descriptive steps.—Describe ploughing and sowing, springing up of blade, growth, ripening, harvesting, thrashing, grinding.

Reading Lesson. Sound *oat*.—One fine day father said to Tom and Dick, "Put on your coats, and we will go and see the farmer sow his oats. Nan and Bess cannot go; they have got sore throats. On the way to the farm they saw some boats. The farmer had six goats. One goat fell in the pond. It could not float, but father took off his coat and got it out.

Painting.

Wheat. Illustrations.—Ears of wheat, flour, oatmeal.

Method.—Contrast ears of wheat with ears of corn; flour with oatmeal.

Reading Lesson. Sound *eat*.—When the heat of the sun had made the wheat ripe, we went to see the farmer cut it down. We took some meat in a neat bag. We found a nice seat where we could see the farmer and his men. Tom and Dick ran a race. Tom beat Dick.

Bread. Things required.—Flour, barm, water, salt.

Method.—Make dough *with* barm and *without*. Allow both to stand for some time. Make children notice difference. Explain use of barm in making bread light.

Reading Lesson.—Sound *ead*.—Little Tim is so sad. His bird is dead. He went to see mother bake the bread. He is so small that his head cannot be seen above the table. He got up on the table, but mother was in great dread lest he should fall. So she put him on the chair instead. She spread a cloth on the table, and gave him some nice bread and jam.

Modelling.

Cottage Loaf.—Make children break plasticine into two pieces. Roll each piece lightly between palms (*not on board*) till perfectly round. Let them examine shape of cottage loaf, mould one piece to shape of lower part; then second piece, making hole with finger. The handle of a "pricker" is a good tool to use in making the indentations. Each child should have a piece of clean paper on which to place finished model.

Bird's Nest.—Make children break off five very small pieces. Make large piece and five small pieces perfectly round. Insert forefinger in large piece, work it to hollow out nest. Then with finger and thumb mould edge into shape. Roughen outside with pricker. Take each small piece, lay it on palm of left hand, and with right forefinger roll it until oval shape is produced. A good effect is produced by using yellow plasticine for the eggs, and a few blades of grass in green plasticine might be added. Mould the plasticine first into a perfect ball, then proceed as when

Mr. H. J. SMITH'S CLASSES.

PRELIM., 1909.—Miss G. Fletcher obtained **DISTINCTIONS** in Geography, Mathematics, Science, French.

CERTIF., 1908.—Miss E. J. Stephens obtained **DISTINCTIONS** in History, Geography, Mathematics.

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RECITATION.

The Skylark.

Bird of the wilderness,
Blithesome and cumberless,
Sweet be thy matin o'er moorland and lea!
Emblem of happiness,
Blest is thy dwelling-place—
Oh, to abide in the desert with thee!
Wild is thy lay and loud,
Far in the downy cloud;
Love gives it energy, love gave it birth.
Where, on thy dewy wing,
Where art thou journeying?
Thy lay is in heaven, thy love is on earth.

The Little Girl and the Skylark.

A happy little maiden, singing a merry tune,
Went skipping through a hayfield one sunny morn in June;
When, lo! a pretty birdie, with tiny wings outspread,
Sprang from the ground before her, and rose above her head.
The little maiden halted, and gazed with straining eyes,
To watch him soaring higher and higher towards the skies.
As upwards still he mounted, outpoured his joyous song—
Such glorious notes of music, so clear and true and strong!
Breathless the child stood watching, a tiny speck he'd grown,
Still of the joyous music faint echoes back were thrown.
Ah, then, she saw him coming down through the sunlit air,
Back to the tiny nestlings who needed still his care.
Down, down, until he hovered o'er some rushes waving tall,
His little wings he folded, then dropped like a leaden ball.
Forward with stumbling footsteps the little maiden pressed,
And joyfully she chuckled, "Ah! now I've found his nest."
Oh, foolish little maiden! to think the lark would show
His darling little nestlings to any passing foe.

COLOURING.

Yon waving clump of rushes is yards and yards away
From the nest tow'rds which he's stealing through the sheltering stalks of hay.

SONG.

"The Farmer" (*Gill's Action Songs for Infant Schools*).

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1. Competitors should cut out and send the *coupon* which appears on the Back Wrapper page of the current number. One coupon must be sent for each entry.
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3. No competitor may take the prize offered more than once in three months.

Special Notice.—Prize-winners for March, May, and June are asked to send name and address.

WITH this month's issue we are making an experiment. We give below a specimen of French verse to be translated into *English Verse*. A Prize of **Half a Guinea** is offered for the best translation, and all renderings must be received not later than November 6, 1909. If the number of translations sent in is at all encouraging, we shall continue the competition.

CHANSON DE FORTUNIO.

Si vous voulez que je vais dire
Qui j'ose aimer
Je ne saurais pour un empire
Vous la nommer.

Nous allons chanter à la ronde,
Si vous voulez,
Que je l'adore, et qu'elle est blonde
Comme les blés.

Je fais ce que sa fantaisie
Veut m'ordonner,
Et je puis, s'il lui faut ma vie,
La lui donner.

Du mal qu'une amour ignorée
Nous fait souffrir
J'en porte l'âme déchirée
Jusqu'à mourir.

Mais j'aime trop, pour que je die
Qui j'ose aimer,
Et je veux mourir pour ma mie,
Sans la nommer.

A. DE MUSSET.

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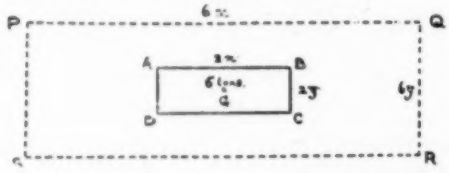
1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. Correspondents must in all cases state the source from which their query has been obtained.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

J. Sc.—A crane is on a four-wheeled railway truck weighing 6 tons. The area of the base formed by the wheels is 50 sq. ft. Neglecting the weight of the crane, calculate the area of the ground from which a mass of 3 tons can be lifted by the crane.

We suppose the crane fixed to the truck. When the mass of 3 tons is being lifted the chain from the crane will hang vertically. The mass can be lifted provided the truck does not tilt up. If the truck tilt it will do so about one pair of wheels. We suppose the brakes of the truck on, so that the wheels cannot revolve. Let ABCD be the points of contact of the wheels with the ground.



The area formed by the wheels is then ABCD. Let this rectangle have sides $2x$, $2y$. The weight of the truck acts vertically downwards through G, the symmetrical point. Now suppose the mass at an extreme point, so that the truck is about to turn about the line DC. In this case the moments of the weights of the truck and the mass about DC must be equal.

$\therefore 6 \times y = 3 \times$ distance between DC and the mass.

$\therefore$ the mass in its extreme position lies on a line SR whose distance from DC is $2y$.

So when the truck is on the point of tilting round BC the mass lies on a line QR distant $2x$ from BC, and so on.

Hence the mass must lie inside the rectangle PQRS, whose sides are $6x$ and $6y$.

The area of the rectangle PQRS

$= 6x \times 6y$
$= 36xy$
$= 9 \times 4xy$
$= 9 \times$ area of the rectangle ABCD
$= 9 \times 50$
$= 450$ square feet.

François.—The axes being rectangular, construct by tangents the conic which has the origin for a focus and touches the three lines

$$x = 2, \ \frac{x}{9} + \frac{y}{5} + \frac{1}{3} = 0, \ x + y = 3.$$

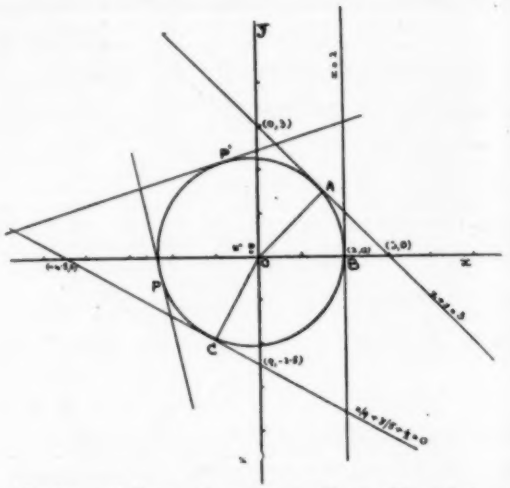
(London B.Sc. Final.)

The foot of the perpendicular from the focus of a conic on a tangent lies on the auxiliary circle, unless the conic is a parabola, in which case it lies on the tangent to the parabola at the vertex.

Draw then the graphs of the three straight lines given as tangents, and let OA . OB . OC be the perpendiculars from the origin on these straight lines.

Then A, B, C lie on the auxiliary circle, and since three points determine a circle we can draw the auxiliary circle. Its centre is shown at D, D is therefore also the centre of the conic.

Now we can draw as many tangents to the conic as we please, for let P be any point on the auxiliary circle. Join OP, and draw a line through P perpendicular to OP. This line is a tangent to the conic, for the foot of the perpendicular on it from a focus lies on the auxiliary circle. So at P′.



The line DO is the major axis of the conic, and H, where

$$HD = DO,$$

is the other focus. The foot of the perpendicular, from H on the tangents, also lies on the auxiliary circle.

The question is badly set, because the distance between the foci is small, and consequently the tangents to the conic cut the circle in points near to each other, and the conic is difficult (in drawing) to distinguish from the circle. The circle given in the figure is, I regret to say, a trifle too small.

The line HDO cuts the circle at the ends of the major axis. The length of the major axis is 4·4, of the minor axis 4·39.

Geo. M. E. Fryer.—Rationalise the equation

$$\sqrt{y} = \sqrt{x} + \sqrt{(x-1)},$$

and show that all values of x and y which simultaneously satisfy it form part of the solutions of

$$x = \frac{(y+1)^2}{4y}.$$

Draw the graph of the latter curve, and indicate upon it that portion which corresponds to those solutions of the first equation in which y is positive. (B.Sc., 1904.)

Since $\sqrt{y} = \sqrt{x} + \sqrt{x-1}$,

values of x and y which satisfy this will also satisfy

$$y = (\sqrt{x} + \sqrt{x-1})^2;$$

that is, $y = x + x - 1 + 2\sqrt{x^2 - x}$;

that is, $y - 2x + 1 = 2\sqrt{x^2 - x}$.

They therefore also satisfy

$$(y - 2x + 1)^2 = 4x^2 - 4x;$$

that is, $(y+1)^2 - 4x(y+1) + 4x^2 = 4x^2 - 4x$,

or $4xy = (y+1)^2$.

This equation can be written

$$y(y - 4x + 2) = -1,$$

hence it represents a hyperbola whose asymptotes are $y = 0$ and $y - 4x + 2 = 0$.

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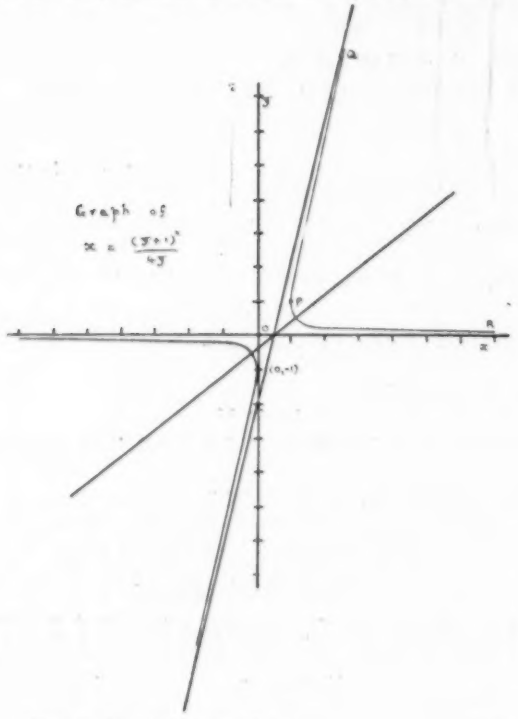
Draw the graphs of these asymptotes, and the straight line bisecting the angle between them. This latter is an axis of symmetry. Since xy is positive, x and y have the same sign. The following points indicate the exact position of the curve :—

Positive Values.

y	0	1	2	3	4	5	6	7	·1	·2	·3	·4	·6	·8
x	∞	1	1·1	1·3	1·6	1·8	2	2·3	3	1·8	1·4	1·2	1·07	1·01

Negative Values.

$-y$	1	2	3	4	5	6	7	·1	·2	·3	·4	·5
$-x$	0	·1	·3	·6	·8	1	1·3	2	·8	·4	·2	·1



Now in the original equation

$$\sqrt{y} = \sqrt{x} + \sqrt{x-1}.$$

For y to be real x must be positive and greater than 1. When x equals 1 y is also 1. This is shown at the point P. If the values of the radicals $\sqrt{x}$ and $\sqrt{x-1}$ are taken, both positive or both negative, then as x increases y also increases, and the corresponding values of y are given by the portion of the curve marked PQ. If the values of the radicals $\sqrt{x}$ and $\sqrt{x-1}$ are taken with opposite signs, as x increases y decreases, and the corresponding values of y are given by the part of the curve marked PR.

Timmy.—State Pascal's and Brianchon's Theorems, and apply the latter to solve the following problems, in each case without drawing the conic in question.

(*a*) Five tangents to a conic are given in position. It is required to determine whether it is a parabola.

(*b*) An asymptote of a conic, two tangents, and the point of contact of one of the tangents are given. It is required to construct the point of contact of the other tangent.

(B.Sc., London, 1907.)

Pascal's Theorem.—If a hexagon is inscribed in a conic, the three intersections of pairs of opposite sides are collinear.

Brianchon's Theorem is the reciprocal of this, namely :—*If a hexagon is circumscribed to a conic, the three joins of pairs of opposite vertices (that is, the diagonals) are concurrent.*

It should be noted that no restrictions are given as to the shape of the hexagon : it can be reentrant or otherwise. Thus if A, B, C, D, E, F are six points on a conic, any figure with these points as vertices, taken in any order, can be regarded as an inscribed hexagon—for example, DFBCAE. Any set of six points on a conic will give us sixty different hexagons, and for each hexagon the line on which the intersections of opposite sides lie will, as a rule, be different. Thus a set of six points gives sixty Pascal lines. Another point of view is important : five points determine a conic, hence given five points, and therefore the conic through them, Pascal's Theorem is the condition that any sixth point should lie on this conic.

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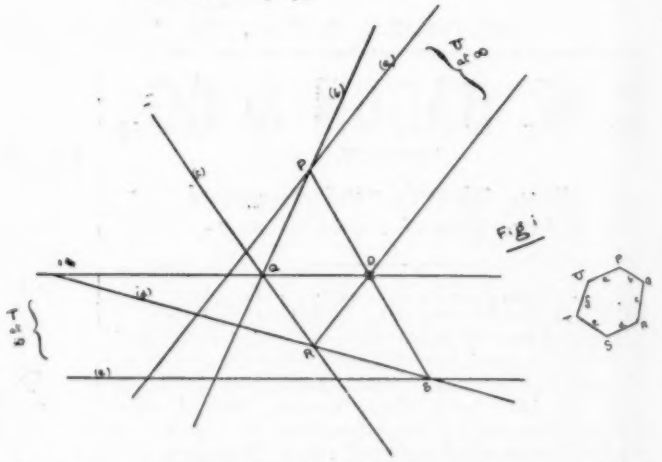
$$\left.\begin{matrix} DF \\ CA \end{matrix}\right\} \quad \left.\begin{matrix} FB \\ AE \end{matrix}\right\} \quad \left.\begin{matrix} BC \\ ED \end{matrix}\right\} \text{ and } \left.\begin{matrix} df \\ ca \end{matrix}\right\} \quad \left.\begin{matrix} fb \\ ae \end{matrix}\right\} \quad \left.\begin{matrix} bc \\ ed \end{matrix}\right\},$$

where DF means the join of D and F, and df the intersection of d and f.

Or they may draw an ordinary hexagon in Euclid's sense, and put the vertices or sides round in the order required, as shown in the auxiliary figure in Fig. 1.

It should also be noted that two sides or vertices of the hexagon may become coincident, in which case the side corresponding to the coincident vertices is a tangent at the point to the conic, or the vertex corresponding to the coincident sides is the point of contact of this side with the conic. Many properties of inscribed and circumscribed pentagons, quadrilaterals, or triangles can be thus deduced.

(*a*) This depends on the fact that a parabola touches the line at infinity, and consequently this line can be taken as one side of a circumscribing hexagon. Let us denote the line at infinity by f.



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Join PS. Since T is at infinity on c, we can draw QT by making it parallel to c. Similarly RU is parallel to a. The test required is then whether these three lines so drawn are concurrent. In the figure given the lines $abcde$ were taken tangents to a parabola, and PS . QT . RU thus meet at the Brianchon point O.

(*b*) For this proposition we shall have to discover what Brianchon's Theorem becomes in the special case when three pairs of sides respectively become coincident.

Fig. 2 shows six tangents, $abcdef$, to a conic, forming a hexagon whose vertices are ABCDEF. Fig. 3 shows the hexagon when the pairs of sides ab, cd, ef are coincident.

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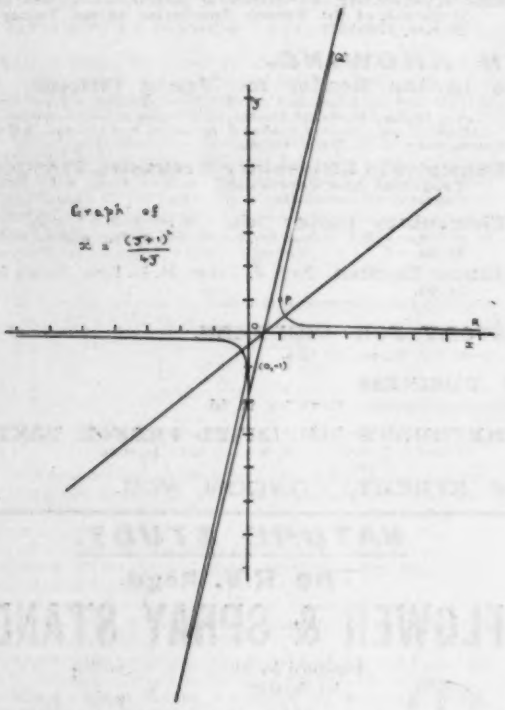
Draw the graphs of these asymptotes, and the straight line bisecting the angle between them. This latter is an axis of symmetry. Since xy is positive, x and y have the same sign. The following points indicate the exact position of the curve:—

Positive Values.

y	0	1	2	3	4	5	6	7	·1	·2	·3	·4	·6	·8
x	∞	1	1·1	1·3	1·6	1·8	2	2·3	3	1·8	1·4	1·2	1·07	1·01

Negative Values.

$-y$	1	2	3	4	5	6	7	·1	·2	·3	·4	·5
$-x$	0	·1	·3	·6	·8	1	1·3	2	·8	·4	·2	·1



Now in the original equation

$$\sqrt{y} = \sqrt{x} + \sqrt{x-1}.$$

For y to be real x must be positive and greater than 1. When x equals 1 y is also 1. This is shown at the point P. If the values of the radicals $\sqrt{x}$ and $\sqrt{x-1}$ are taken, both positive or both negative, then as x increases y also increases, and the corresponding values of y are given by the portion of the curve marked PQ. If the values of the radicals $\sqrt{x}$ and $\sqrt{x-1}$ are taken with opposite signs, as x increases y decreases, and the corresponding values of y are given by the part of the curve marked PR.

Timmy.—State Pascal's and Brianchon's Theorems, and apply the latter to solve the following problems, in each case without drawing the conic in question.

(*a*) Five tangents to a conic are given in position. It is required to determine whether it is a parabola.

(*b*) An asymptote of a conic, two tangents, and the point of contact of one of the tangents are given. It is required to construct the point of contact of the other tangent.

(B.Sc., London, 1907.)

Pascal's Theorem.—If a hexagon is inscribed in a conic, the three intersections of pairs of opposite sides are collinear.

Brianchon's Theorem is the reciprocal of this, namely:—*If a hexagon is circumscribed to a conic, the three joins of pairs of opposite vertices (that is, the diagonals) are concurrent.*

It should be noted that no restrictions are given as to the shape of the hexagon: it can be reëntrant or otherwise. Thus if A, B, C, D, E, F are six points on a conic, any figure with these points as vertices, taken in any order, can be regarded as an inscribed hexagon—for example, DFBCAE. Any set of six points on a conic will give us sixty different hexagons, and for each hexagon the line on which the intersections of opposite sides lie will, as a rule, be different. Thus a set of six points gives sixty Pascal lines. Another point of view is important: five points determine a conic, hence given five points, and therefore the conic through them, Pascal's Theorem is the condition that any sixth point should lie on this conic.

The same remarks apply to Brianchon's Theorem. If $abcdef$ are six tangents to a conic, any of the sixty hexagons having these lines, taken in any order as sides, may be used, and thus to six tangents correspond sixty Brianchon points. Students sometimes find a difficulty in deciding which are the opposite sides or opposite vertices of a complicated reëntrant hexagon. They should write down the vertices or sides in the order which they intend to use—for example, DFBCAE or $dfbcae$, then the opposite sides and vertices are—

$$\left.\begin{matrix}\text{DF}\\ \text{CA}\end{matrix}\right\rangle \quad \left.\begin{matrix}\text{FB}\\ \text{AE}\end{matrix}\right\rangle \quad \left.\begin{matrix}\text{BC}\\ \text{ED}\end{matrix}\right\rangle \text{ and } \left.\begin{matrix}df\\ ca\end{matrix}\right\rangle \quad \left.\begin{matrix}fb\\ ae\end{matrix}\right\rangle \quad \left.\begin{matrix}bc\\ ed\end{matrix}\right\rangle,$$

where DF means the join of D and F, and df the intersection of d and f.

Or they may draw an ordinary hexagon in Euclid's sense, and put the vertices or sides round in the order required, as shown in the auxiliary figure in Fig. 1.

It should also be noted that two sides or vertices of the hexagon may become coincident, in which case the side corresponding to the coincident vertices is a tangent at the point to the conic, or the vertex corresponding to the coincident sides is the point of contact of this side with the conic. Many properties of inscribed and circumscribed pentagons, quadrilaterals, or triangles can be thus deduced.

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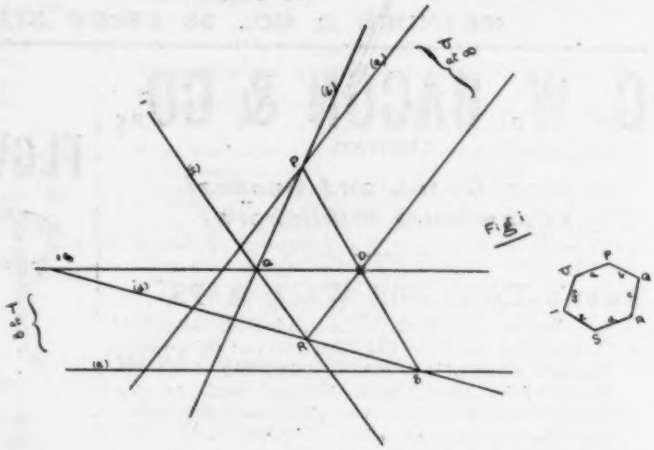

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Fig. 2 shows six tangents, $abcdef$, to a conic, forming a hexagon whose vertices are ABCDEF. Fig. 3 shows the hexagon when the pairs of sides ab, cd, ef are coincident.

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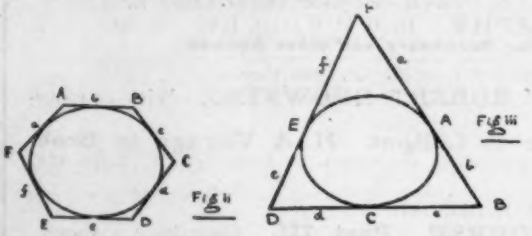
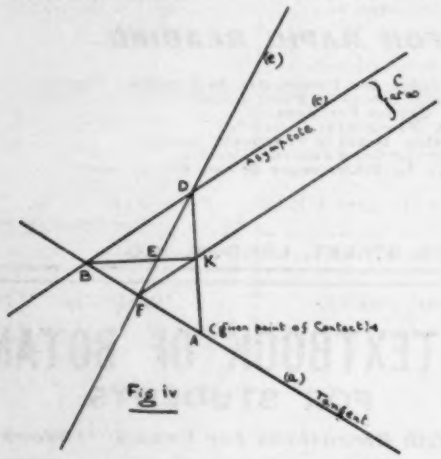
The three vertices ACE are then points of contact of the sides of the triangle. Thus Brianchon's Theorem becomes—If a triangle circumscribe a conic, the three joins of the vertices to the points of contact of the opposite sides are concurrent.

Now to apply this to the question: The given asymptote touches the curve at infinity. Let its point of contact



correspond to the point C (Fig. 3), then C is at infinity on the asymptote BD.

Again, let the line BFA be the given tangent and A the given point of contact, and FD be the other given tangent. Its point of contact (E) is required.



We have seen that AD, FC, BE are concurrent.

Hence the method: Join AD. Draw FC parallel to the asymptote BD—that is, to meet the asymptote at its point of contact C at infinity. If AD, FC meet at K, join BK. Hence BK passes through E, thus the intersection of BK and FD is the point required.

Maths.—(a) If $\left(\frac{c+d}{a+b}\right)^2 - 2 + \left(\frac{c-d}{a-b}\right)^2 = 0$, show that

$$(a^2 - b^2)^2 = (bc - ad)^2 + (ca - bd)^2,$$

and assign a geometrical meaning to these relations.

(b) Show that $(1+a)^{\frac{1}{n}} + (1-a)^{\frac{1}{n}}$ is less than 2 when a is a number less than unity and n is a positive whole number. Verify this when $9a = 1$ and $n = 5$.

(Board of Education, Honours, 1909.)

(a) Let $\frac{c+d}{a+b} \equiv x$ and $\frac{c-d}{a-b} \equiv y$,

thus $x^2 + y^2 = 2$.

Then
$$x - y = \frac{c+d}{a+b} - \frac{c-d}{a-b} = \frac{(c+d)(a-b) - (a+b)(c-d)}{a^2 - b^2} = \frac{2(ad - bc)}{a^2 - b^2},$$

so $x + y = \frac{2(ac - bd)}{a^2 - b^2}$.

But $(x+y)^2 + (x-y)^2 = 2(x^2 + y^2) = 4$;

that is,
$$\frac{4(ac - bd)^2}{(a^2 - b^2)^2} + \frac{4(ad - bc)^2}{(a^2 - b^2)^2} = 4,$$

or
$$(ac - bd)^2 + (ad - bc)^2 = (a^2 - b^2)^2.$$

The geometrical meaning of these relations as they stand is not obvious. The equations are quartic in a, b, c, and d, and consequently if lengths are assigned to these quantities no meaning in pure geometry is possible. I have proved the relation in the form—

If $x^2 + y^2 = 2$, then $(x+y)^2 + (x-y)^2 = 4$,

and to this corresponds the fact—"If the square on the hypoteneuse of a right-angled triangle is 2 units, then the hypoteneuse of a right-angled triangle whose sides are respectively the sum and difference of the sides of the first triangle is of length 2."

If any more direct geometrical meaning occurs to me, I will give it in a later number.

(b) This inequality follows at once from the expansion by the Binomial Theorem of the two quantities, and this is allowable, for since $a < 1$ both such series are convergent.

Thus
$$(1+a)^{\frac{1}{n}} = 1 + \frac{a}{n} + \frac{\frac{1}{n}\cdot\left(\frac{1}{n} - 1\right)}{\lfloor 2} \cdot a^2 + \frac{\frac{1}{n}\cdot\left(\frac{1}{n} - 1\right)\left(\frac{1}{n} - 2\right)}{\lfloor 3} a^3 + \ldots$$

$$= 1 + \frac{a}{n} - \frac{\frac{1}{n}\left(1 - \frac{1}{n}\right)}{\lfloor 2} a^2 + \frac{\frac{1}{n}\left(1 - \frac{1}{n}\right)\left(2 - \frac{1}{n}\right)}{\lfloor 3} a^3 + \ldots$$

and
$$(1-a)^{\frac{1}{n}} = 1 - \frac{a}{n} - \frac{\frac{1}{n}\left(1 - \frac{1}{n}\right)}{\lfloor 2} a^2 - \frac{\frac{1}{n}\left(1 - \frac{1}{n}\right)\left(2 - \frac{1}{n}\right)}{\lfloor 3} a^3 - \ldots$$

$$\therefore (1+a)^{\frac{1}{n}} + (1-a)^{\frac{1}{n}} = 2 - 2\left\{\frac{\frac{1}{n}\left(1 - \frac{1}{n}\right)}{\lfloor 2} a^2 + \frac{\frac{1}{n}\left(1 - \frac{1}{n}\right)\left(2 - \frac{1}{n}\right)\left(3 - \frac{1}{n}\right)}{\lfloor 4} a^4 + \ldots\right\},$$

all the terms in the brackets being positive, since $\frac{1}{n} < 1$, n being a positive integer.

$$\therefore (1+a)^{\frac{1}{n}} + (1-a)^{\frac{1}{n}} < 2.$$

In the special case we have to verify that

$$\sqrt[5]{\frac{10}{9}} + \sqrt[5]{\frac{8}{9}} < 2.$$

$$\log \sqrt[5]{\frac{10}{9}} = \tfrac{1}{5}\{1 - \log 9\} = \tfrac{1}{5}\{1 - \cdot 9542425\}$$
$$= \tfrac{1}{5} \times \cdot 0457575 = \cdot 0091515;$$

that is,
$$\sqrt[5]{\frac{10}{9}} = 1 \cdot 0213.$$

$$\log \sqrt[5]{\frac{8}{9}} = \tfrac{1}{5}\{\log 8 - \log 9\} = \tfrac{1}{5}\{\cdot 9030900 - \cdot 9542425\}$$
$$= \tfrac{1}{5} \times -\cdot 0511525 = -\cdot 0102305$$
$$= \bar{1} \cdot 9897695$$
$$= \log \cdot 97671,$$

and $1 \cdot 0213 + \cdot 97671 = 1 \cdot 99801 < 2$.

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A NEW SCHOOL HISTORY.

IN reviewing yet another school history one must look first for features which differentiate the book from its numerous predecessors. The authoress of the particular volume now before us—*A History of Great Britain* (Methuen and Co.)—Miss E. M. Wilmot-Buxton, seems to feel that some apology is necessary, and we get it in the preface. On the whole, it is sufficient vindication of the new venture.

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